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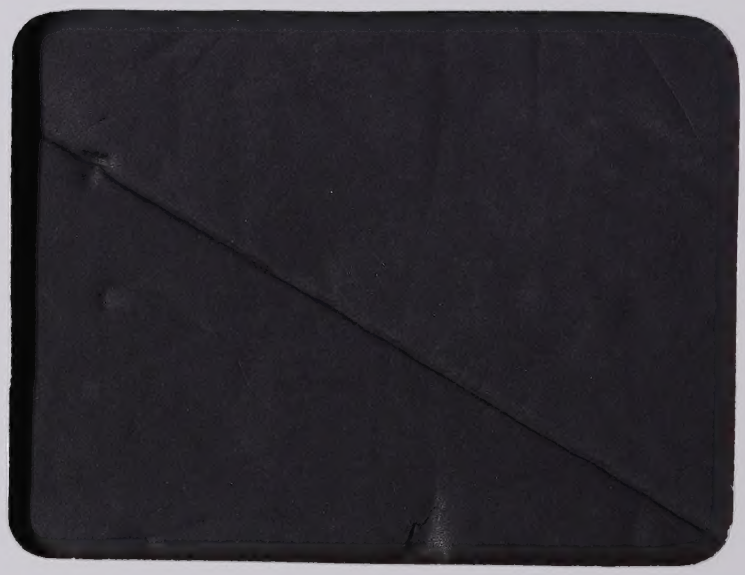
System Manager's Guide 36535

227X Board Test Workstations

(Release 7.4) Model: 2275

Form 2272-0153-D

Instruction Manual



Contents

Foreword
Introduction – Section 1
Software Installation – Section 2
System Software Management – Section 3
System Access – Section 4
Partitions and Installed Tasks – Section 5
Device Management – Section 6
Trouble Analysis – Section 7
Software Updates – Appendix A
Index

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(Release 7.4) Model: 2275

Form 2272-0153-D

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List of Effective Pages

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margin of the page.

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 72 CONSISTING OF THE FOLLOWING:

Issue Original Date November, 1983

Page No.	Issue
Title	Original
A	Original
iii through vi	Original
1-1 through 1-2	Original
2-1 through 2-16	Original
3-1 through 3-16	Original
4-1 through 4-8	Original
5-1 through 5-4	Original
6-1 through 6-8	Original
7-1 through 7-4	Original
A-1 through A-6	Original
I-1	Original

*The asterisk indicates pages changed, added, or deleted by the current change.

See System Operation manual for Warnings and Cautions.

NOTE

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Table of Contents

Section and Paragraph		Page
FOREWORD		
1 INTRODUCTION		
1.1	Introduction	1-1
2 SOFTWARE INSTALLATION		
2.1	Introduction	2-1
2.2	Loading Software on a 2271 or 2272 System	2-1
2.3	Loading Software on a 2275 System	2-4
2.4	229X Program Preparation Software	2-11
3 SYSTEM SOFTWARE MANAGEMENT		
3.1	MCR/VMR	3-1
3.2	Utilities	3-11
3.3	Using VMR to Change System Characteristics	3-13
3.4	Indirect Command Files	3-14
4 SYSTEM ACCESS CONTROL		
4.1	Introduction	4-1
4.2	Login Accounts	4-1
4.3	System Access Control	4-6
4.4	Adding File Directories via the UFD Directive	4-8
5 PARTITIONS AND INSTALLED TASKS		
5.1	Introduction	5-1
5.2	Recommended Memory Partition Strategy	5-1
5.3	Installing and Removing Tasks	5-1
5.4	Task Priority and Checkpointing Strategies	5-2
5.5	Changing Priorities of System Tasks	5-3
5.6	Changing Memory Partitions	5-4
5.7	Executive Dynamic Storage (Pool)	5-4
6 DEVICE MANAGEMENT		
6.1	Introduction	6-1
6.2	Logical Device Assignments	6-1
6.3	Disk and File Management	6-1
6.4	Re-Entering the Background Monitor	6-3
6.5	Effective Foreground/Background Operation	6-3
6.6	Setting Time and Date (2270, 71, 72)	6-5
6.7	Test Fixture Control	6-6
7 TROUBLE ANALYSIS		
7.1	Introduction	7-1
7.2	The System Won't Boot	7-1
7.3	Background Terminal Won't Work	7-1
7.4	Disk Platter Starts Giving Random Errors	7-2
7.5	Disk Drive Fails	7-3
7.6	A Program Mysteriously Stops Working	7-3
7.7	The Printer Jambs While Spooling Files	7-3
7.8	In Case of Power Failure	7-4
APPENDIX A — SOFTWARE UPDATES		
A.1	How to Use ZAP	A-1
A.2	How to Use Indirect ZAP Command Files	A-3
INDEX		

Foreword

GENERAL

This guide contains information that is necessary for effective management of a 227X Board Test Workstation. Management of any system implies both a set of policies and procedures and the tools needed to implement these policies and procedures. This guide concentrates on the tools, recognizing that the policies and procedures will need to vary for each application.

USING THIS GUIDE

The System Manager's Guide is a tool for use by the 227X system manager. The guide contains both detailed procedures and strategies and recommendations for effectively managing a 227X system. Throughout this guide, it is assumed that the system manager has attended the appropriate GenRad 227X Training Course and is familiar with the RSX-11M Operating System.

This guide is only for the use of the system manager. Detailed operating procedures for other 227X users are found in the manuals listed in the 227X Document Directory.

The guide is divided into the following sections:

Section 1 - Introduction
Section 2 - Software Installation
Section 3 - System Software Management
Section 4 - System Access
Section 5 - Partitions and Installed Tasks
Section 6 - Device Management
Section 7 - Trouble Analysis
Appendix A - Software Updates
Index

Section 1 describes the system manager's role in maintaining the system.

Section 2 describes the procedures for loading the 227X system software for this release onto a 227X Board Test Workstation and a 229X Central Station.

Section 3 describes the RSX-11M command languages (MCR and VMR), privileged and non-privileged commands, programs, utilities, and indirect-command files.

Section 4 describes the methods by which system security is maintained and system-user status is specified. The system manager will normally assign passwords and system access privileges.

Section 5 discusses some issues concerning the RSX-11M executive software partition, recommended checkpointing strategies, and installing and removing tasks.

Section 6 presents some device management strategies and the logical device assignments used in 227X systems.

Section 7 contains information to improve system operation and some trouble analysis information.

Appendix A contains information about making system modifications using the ZAP Patching Utility or an indirect-command file software installer.

The index contains a list of topics in alphabetical order for easy reference.

CONVENTIONS

The following conventions apply to procedures described in this manual:

1. When the term "227X" is used to refer to a system, the type of system can be a 2270, a 2271, a 2272, or a 2275 Board Test Workstation. If a specific type of system is listed, then the command or description applies only to that type of system. Similarly, the term "VT10X" means either a VT100 or a VT101 terminal.

2. Unless otherwise specified, commands are executed or command lines are terminated by pressing the RETURN key.

3. The symbol "CTRL" is used to indicate that the CTRL key is held down while another key is being pressed. The CTRL key provides alternate functions for some of the keys on the keyboard. As an example of the way that this term is used in this manual, CTRL C means that the CTRL key is held down while the C key is pressed.

4. The term DMn: refers to Phoenix disk surfaces DM0: through DM3:, which are used on 2271 and 2272 systems. The term DKn: refers to Hawk disk devices DK0: through DK7:, which are used on 2270 systems. The term FWn: refers to all storage devices, FW0: through FW3:, which are used on 2275 systems. The use of pseudo-device names for device specifications is preferred over these physical names to allow device independence and to allow default device changes for local operations. Refer to the 227X Test Set Preparation manual for the pseudo-device names and their corresponding physical disk names.

5. For executing TECO commands, the notation "$$" means that you press the ESC key twice. When used to separate multiple TECO commands, the "$" symbol means that you press the ESC key once. For all other commands, the symbol "$" is a dollar sign (for example, when used with a RUN command such as RUN $ACNT).

RELEASE INFORMATION

This manual is for use with systems that are equipped with the following software releases:

Type of Software	Release
227X	Release 7.4
RSX-11M	Version 4.0

Introduction – Section 1

1.1 INTRODUCTION

1.1.1 General

This manual contains information solely for use by the system manager. The information contained in this manual is not needed by other users of the test system. This manual describes the functions of the system manager, software tools that are primarily available for use by the system manager, and a discussion of considerations for using a system with the Foreground/Background (multi-user) option.

1.1.2 The System Manager

As with any resource, a test system requires proper management to insure efficient use. This is particularly true because of the flexibility of the system; the system is used both for board testing and for program preparation. Since each facility operates under different conditions, and has different requirements, the system software may need to be "tailored." For these reasons, there must be a designated system manager who may be required to make decisions that will affect both the performance of the system and its users (particularly true for multi-user systems where conflicts can arise among users).

The major responsibilities of the system manager include: (1) to ensure that all users of the system are aware of system conventions, (2) to enforce disk back-up and clean-up procedures, (3) in some cases, to reconfigure parts of the system to maximize performance, (4) to provide users with up-to-date system software and general support in operating the system, (5) to receive and to install software updates, etc, and (6) to act as the primary customer interface to GenRad personnel. Some of the specific operations needed to satisfy those functions are:

Set system time and date
Reload system software
Set terminal interface
Update system software
Purge old files from disk(s)
Back-up source files
Add file directories
Change task priorities
Change printer access
Maintain system multi-user protection mechanisms
Monitor system access controls

To accomplish these tasks, the system manager must be familiar with both the system and RSX-11M, and should review all system documentation thoroughly to be familiar with the available functions and commands.

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Software Installation - Section 2

2.1 INTRODUCTION

The master disk cartridge contains the Operating System (OPSYS) software and indirect command files (batch programs) that will "load" Release 7.4 by copying the software from the master disk cartridge to the fixed disk. The command files will display some questions on the video display terminal during the loading procedure. Answering these questions allows you to exercise various options that are built into the software. The selections you make will be in force utnil the software is reloaded.

The master disk cartridge for 2271 and 2272 systems is a CDC Phoenix disk pack. The part numbers are 2272-9666 for a standard system and 2272-9667 for a Foreground/Background system. The master disks for a 2275 are 7 (8 if Foreground/Background system) floppy diskettes. The loading procedure for 2271/2272 systems is described in para 2.2. The loading procedure for a 2275 is described in para 2.3.

2.2 LOADING SOFTWARE ON A 2271 OR 2272 SYSTEM

2.2.1 Reloading System Software

Follow these steps to load system software onto your system:

a. Turn on system power by turning the system power key switch to ON.

b. Load the master disk pack into the Phoenix drive. Press the START/STOP button on the drive to spin up the drive.

c. The drive is ready when the START/STOP button stops flashing and the READY light comes on. The system will boot automatically from DM0:, the fixed system surface. However, if the system has already been booted since the power was turned on, you must press the INITIALIZE button. When the system initializes and the monitor displays the DIAGNOSE page, go on to step d.

If the system doesn't initialize, either automatically or after the boot button is pressed, the operating system on the fixed system disk DM0: must be unbootable. In this case, you must boot the system from the master disk cartridge (in device DM1:).

To boot from the master disk cartridge (or any device other than DM0:), you must first halt the processor. Type:

>\<ESC\>\<RESET\>

An at sign prompt ("@") will appear. From this prompt type:

@773400G

Now you should see a dollar sign "$" prompt displayed on the screen. At this point you may type the name of the device you wish to boot from, and the system will initialize. To boot from the master cartridge in device DM1:, type:

$DM1

Note that you must leave out the colon in the device name.

Go to step f; the indirect command files start loading the software automatically when you boot the system from the Master Disk cartridge.

d. Shut down the system monitor by typing:

#SHU

e. Start the indirect command files that load the software by typing:

>@AL:OPSYSBOOT

f. The indirect command file will display the following yes/no questions on the video display. Answer them by typing Y or N.

```
>* DO YOU WISH TO SEE THE HELP FILE FOR LOADING THE SOFTWARE? [Y/N]:

>* DO YOU WANT IT LISTED TO THE STRIP PRINTER (LP0:)? [Y/N]:

>* THE LINE PRINTER (LP1:)? [Y/N]:

>* THE SCREEN (TI:) (WILL DISPLAY VERY QUICKLY)? [Y/N]:
```

g. After the HELP file is displayed, or after the first question is answered with N, the following cautionary message and question are displayed:

```
WARNING:  ALL INFORMATION ON THE FIXED DISK WILL BE DESTROYED
          DURING THE PROCESS OF CREATING THE NEW 227X OPERATING
          SYSTEM ON THAT DISK DEVICE.
>;
>;
>;
>* DO YOU WISH TO CONTINUE? [Y/N]:
```

h. If you answer the question with N, the indirect command file ends and the MCR prompt ">" followed by "<EOF>" is displayed. Type Y, and the command file will prompt you with:

```
>* DO YOU WANT TO RE-FORMAT FIXED SYSTEM DISK (DM0: - USUALLY NO)? [Y/N]:
```

This question is marked USUALLY NO because the fixed system disk is formatted during the initial installation of the test system. The fixed system disk should not require reformatting unless the disk has been corrupted by a power surge or some other transient condition.

i. Next, you will be asked:

```
>;DO YOU WANT TO REINITIALIZE FIXED USER SURFACES (DM2:/DM3:)
>* (YES FOR NEW INSTALLATIONS)? [Y/N]:
```

Answer this question with a Y if your tester is new, or when your user surfaces have been corrupted enough to be unusable, i.e., if you cannot read the surfaces or write on them, you must re-initialize them. Re-initializing will erase all

the information on the disk (the disk is reformatted as well as re-initialized during this operation), so consider it carefully before you exercise this option. If you answer Y, this process may take 5 to 15 minutes to complete.

j. The next series of questions allows you to delete parts of the system software that you do not need from the fixed disk. This will free up additional space on the fixed disk.

```
>; DO YOU WISH TO HAVE ANY FILES REMOVED FROM THE FIXED DISK TO
>* FREE UP MORE USABLE SPACE (USUALLY YES)? [Y/N]:
```

If yes, the next five questions appear for defining what is to be deleted.

```
>* DELETE THE TEST LIBRARY OBJECT (USUALLY NO)? [Y/N]:
```

If you delete the Test Library Object file, Analog ATG will not be usable.

```
>* DELETE THE TEST LIBRARY SOURCE (USUALLY YES)? [Y/N]:
```

If you delete the Test Library Source file, you will not be able to look at individual tests within the Analog Library.

```
>* DELETE THE DIGITAL TEST & UPDATE LIBRARIES (USUALLY NO) [Y/N]:
```

If you delete the Digital Test and Update Libraries, Digital ATG will only draw tests from the User Library when assembling a test program.

```
>* DELETE THE OVP FILES (USUALLY NO)? [Y/N]:
```

If you delete the OVPs, the system check-out procedure cannot be run.

```
>* DELETE HELP FILES (USUALLY NO)? [Y/N]:
```

If you delete the HELP FILES, you will not be able to access the general Help files while using the tester for programming or testing boards. Page and selection specific help will still be available.

k. At this point, the command file has finished reloading the software and displays this message:

```
THE RELOADING OF SYSTEM SOFTWARE HAS BEEN COMPLETED.
PLEASE POWER DOWN THE DISK DRIVE, REMOVE AND STORE
THE MASTER OPERATING SYSTEM DISK IN A SAFE PLACE.

INSTALL A USER CARTRIDGE IN THE DRIVE AND BOOT THE SYSTEM.
```

l. Press the START/STOP button to "spin down" the drive.

m. Remove the master disk cartridge from the drive and store it safely.

n. Place a user disk cartridge in the drive.

o. Press the START/STOP button to "spin up" the drive.

p. Press the INITIALIZE button.

If you haven't already made copies of original master disk cartridge to use as working masters, use the DCOPY Monitor page to make at least one copy for a backup. Refer to para 2.2.2.

The tester is now loaded with the software (bootable software is on the fixed disk). Archive the working master with the original master disk.

2.2.2 Making Backup Copies of the Master Disk Cartridge

Use this procedure to make backup copies of the Master Disk cartridge:

a. Call the DCOPY page by typing:

#DCO

to the high-level command prompt of any monitor page.

b. Have the master disk cartridge in the drive and copy its contents from DM1: to DM3:.

CAUTION

When you copy DM1: to DM3:, all files on DM3: will be lost. Be sure to back up all important files on DM3: before making a backup copy of the master disk cartridge.

c. Press the START/STOP button to spin down the drive.

d. When the START/STOP button stops flashing, remove the master disk cartridge and store it in a very safe place.

e. Place a formatted, blank cartridge in the drive, and press the START/STOP button.

f. When the START/STOP button stops flashing and the Ready light is on.

g. Call up the DCOPY page and copy the contents of DM3: up to DM1:.

h. Spin down the drive and store the cartridge in a safe place. Use this master disk copy as your working master. Save the original master disk cartridge for making new working masters only.

2.3 LOADING SOFTWARE ON A 2275 SYSTEM

This section describes the procedure to run the software loading command file. This command file transfers software from the distribution media (floppy disks) on to the disk storage media (Winchester) of the 2275 Board Test Workstation. The command file prompts you to take action, when necessary.

The software is contained on 7 dual-density, double-sided diskettes. These are labeled "2275 Diskette #1 through #7." An additional diskette is also provided with the Foreground/Background option. The first diskette contains the loading procedure. This procedure can be printed out after a few initial steps are performed. However, it is important to be familiar with the whole procedure prior to getting started, so a copy of the printed procedure is included here so that it can be studied.

2.3.1 Start and Print Loading Procedure

The steps required to start the software loading and to get a printed copy of the entire procedure is listed as follows. These steps are taken from the printed procedure provided in para 2.3.2.

To load Release 7.4 software:

a. Turn system power on.

b. Insert the floppy diskette that is labeled "2275 Diskette #1" into the floppy disk drive (FW0:).

c. Press the SYSTEM BOOT button, and immediately (within 5 seconds) type CTRL C (^C).

d. A prompt "DRIVE?" will appear. To this prompt type FW0, in capital letters, but do not include a colon (:).

```
DRIVE? FW0
```

You will be asked:

```
>* Please enter the Time and Date <HR:MN DA-MON-YR> [S]:
```

Type the time and date in the form 15:45 23-Jul-83. Press the RETURN key.

e. The next question will be:

```
Spool the "Software Load Procedure" to your line printer [Y/N]:
```

Answer yes, by typing a Y, if there is a Mannesman/Tally or a Printronix line printer on the system. Otherwise, answer no by typing an N.

f. If a Y was typed at the previous question, another question is displayed:

```
Which printer is your line printer (LP0:=0, LP1:=1)
```

Answer 1 if you have a Printronix line printer and 0 otherwise.

g. Remove the procedure from the printer and review its contents.

h. There will be a question on the display:

```
OK to continue?
```

Type a Y when ready and follow the printed procedure to finish software loading.

2.3.2 Loading Procedure Listing

The following is the complete loading procedure as it is printed from the first diskette.

THIS SOFTWARE PACKAGE, SUPPLIED BY GENRAD, INC. AS A COMPONENT OF A SYSTEM OR AS A SEPARATE ITEM, IS FURNISHED FOR USE ON A SINGLE CPU. ALL PROPRIETARY RIGHTS RESERVED BY GENRAD, INC. THESE RIGHTS ARE CONSIDERED RESTRICTED RIGHTS AS DEFINED BY ARMED SERVICES PROCUREMENT REGULATION 7-104. 9 (A) (9). DUPLICATION, USE, OR DISCLOSURE IS SUBJECT TO RESTRICTIONS.

The procedure for loading System Software is fully automatic with very little manual intervention. The following is a step-by-step procedure and should be read and understood before loading to minimize questions and problems which may arise. Understanding the configuration questions and trade-offs there are to be made will enable you to tailor the 2275 System Software to fit your needs.

File	Purpose
LB:[1,2]STARTUP.CMD	Upon normal boot, performs global device assignments, mounts disks, and installs application tasks.
LB:[1,2]CONFIG.DAT	System configuration table, generated during software loading; used by other GenRad layered products and application software to learn the System configuration.

Reloading of the system software is necessary when new hardware is added. In this case, load the Master Distribution Diskette (2275 Diskette #1) into the floppy drive, and boot it.

NOTE

If you plan to Badblock or Initialize any Drive on an existing System, any files you wish to save should be backed-up and safeguarded to insure against loss. ALL DATA will be lost on any device that is Formatted, Badblocked, or Initialized.

2275 System Software Loading Procedure

The configuration questions have been designed to produce a baseline Operating System by selecting the "default" answers. This method is suggested if you are unsure how to tailor your System Software to meet your needs, but want to get the System up and running. To select the "default" on any question, press the RETURN key when prompted for an answer.

To load the system software the following steps should be performed:

a. Place the first 2275 Floppy Diskette (2275 DISKETTE #1) in the FW0: drive.

b. Press the SYSTEM BOOT button on the Service panel of the Tester and immediately type CTRL C (^C). A "DRIVE?" prompt will appear:

```
DRIVE?
```

c. To the "DRIVE?" prompt, type "FW0" (no colon or RETURN needed):

```
DRIVE? FW0
```

d. When directed to do so, answer the questions pertaining to your system configuration. These questions are asked once during system configuration and the information is stored in a system file called CONFIG.DAT.

CONFIG.DAT is created when System Software is initially loaded. For subsequent start-ups, STARTUP.CMD reads the configuration data from CONFIG.DAT and continues with other start-up functions, rather than ask you the configuration questions each time you boot the system.

CAUTION

STARTUP.CMD, as well as other GenRad Utilities read, in [1,2]CONFIG.DAT; therefore, to ensure correct execution of all GenRad-supplied software, CONFIG.DAT SHOULD NEVER BE EDITED OR MODIFIED. Modification of CONFIG.DAT may result in corruption of System Software, improper operation-loading of GenRad layered software products, etc.

The following is a brief summary of the questions which will be asked when down-loading system software for the first time.

STARTUP.CMD Question Part I

Q1. Please enter the Time and Date <HR:MN DA-MON-YR> [S]:

You are merely requested to date the system using the format shown (i.e., 17:00 1-JAN-81).

Q2a. Spool the "Software Load Procedure" to your Line Printer [Y/N]:

Q2b. Which is your Line Printer (LP0:="0",LP1:="1") [D. R:0.-1. D:1.]:

Q3. Display the "Software Load Procedure" on your terminal (TI:)? [Y/N]:

Q4. OK to continue ?

The "Software Load Procedure" is this document. This document is designed to walk you through the 2275 Software Load procedure and give a brief explanation on each question. It is recommended that you list a copy to your Printer, in which case you will be asked Question 2b to determine which Unit is your Line Printer (i.e., LP0: = "0" [Tally Mannesman] while LP1: = "1" [Printronix]). If you respond "NO" to Question 2a, Question 3 will be asked.

The following message will appear:

* *

The answers to the following System Configuration Questions are saved in a data file, LB:[1,2]CONFIG.DAT. Once the system has been configured this file is accessed automatically and the related questions will not be asked. CONFIG.DAT is very important to the installation and configuration command files as well as STARTUP.CMD; therefore, CONFIG.DAT SHOULD NEVER BE EDITED.

If CONFIG.DAT becomes corrupted by some future disaster, you will be required to re-load system software.

If you desire to expand your current System by adding NEW hardware, supported by GenRad, please refer to the SYSTEM MANAGER'S GUIDE and the SITE MANAGEMENT GUIDE for further information about re-configuring your System.

* *

Q5. How many Winchester Drives [D R:1.-2. D:1.]:

Enter the number of Winchester Drives in your configuration. The valid range is - Minimum: 1 Maximum: 2 Default: 1

After you respond to Question 5, a table will be displayed indicating the responses to the questions you have answered.

Q6. Have all Configuration Questions been answered correctly? [Y/N]:

If you made an error answering one of the configuration questions, answer "NO" and the procedure will loop and re-ask the configuration questions. A "YES" answer will cause CONFIG.DAT to be written onto the target system disk and System Software loading to begin.

Q7a. Are you updating an Existing system? [Y/N]:

If you are loading 2275 System software on a new installation, the response should be "NO". The Target System disk will then be BadBlocked and Initialized (resulting in LOSS OF ALL DATA on that device). System software will then be downloaded onto the Target device from the Master Distribution Pack.

If you have an existing 2275 System, and want to update your software without disturbing other software on the volume, answer "YES". This will cause only the System software being restored to be deleted from your System disk. All other files will remain intact.

The Default selection is "NO." f you answer "NO" to Question #7a, you will be prompted to answer the following additional questions:

If your system includes a second Winchester drive you will see the message:

```
;       Scratch Device
;       --------------
;            EW3:
;
;   Warning ** Data will be LOST on the device listed above if
;              you respond "YES" to the following question
```

Q7b. BADBLOCK the device listed above ? [Y/N]:

When bringing up a new system all the disks must be Badblocked and Initialized. Answering "YES" to this question will cause the disks listed above to be Badblocked and Initialized. If any of these disks have information that should be saved, answer "NO" to this question.

```
;
;       Warning ** All data will be lost on FW2:.
;
```

Q7c. OK to continue? [Y/N]:

If you are bringing up a new system, answer "YES". A "NO" answer will Halt this procedure.

STARTUP.CMD will display the following messages:

```
;       Cleaning up FW2:...   (IF UPDATING AN EXISTING SYSTEM)
;
;       Creating LB:[1,2]CONFIG.DAT...
;
;       Loading 2275 Diskette #1...
```

VMR will produce the following messages while creating the new System Image. ONLY these messages should be ignored. If any other error messages appear, the System Image was not created properly:

```
>VMR @VMRTMP
VMR -- *DIAG*-Partition reduced to executive common size
INS EXCOM1
VMR -- *DIAG*-Partition reduced to executive common size
INS EXCOM2
VMR -- *DIAG*-Installed tasks may no longer fit in partition
SET /TOP=DRVPAR:-*
```

When VMR finishes, the Target System disk will automatically boot. When the System returns to the MCR Prompt, ">," after booting, type the following MCR command from the console device.

```
>SAVE /WB
```

The Target System Image will now boot and start the second part of the Software Load procedure. The system will display the message:

```
Reading in LB:[1,2]Config.dat...
```

You will then be instructed to remove 2275 Diskette #1 from FW0:, and insert 2275 Diskette #2.

Q8. Press "RETURN" when ready to proceed [S]:

The system will load the software from 2275 Diskette #2 and dismount the volume (you will see the dismount message). You will then be instructed to remove 2275 Diskette #2 from FW0: and to insert 2275 Diskette #3.

Q9. Press "RETURN" when ready to proceed [S]:

The system will load the software from 2275 Diskette #3 and dismount the volume (you will see the dismount message). You will then be instructed to remove 2275 Diskette #3 from FW0: and to insert 2275 Diskette #4.

Q10. Press "RETURN" when ready to proceed [S]:

The system will load the software from 2275 Diskette #4 and dismount the volume (you will see the dismount message). You will then be instructed to remove 2275 Diskette #4 from FW0: and to insert 2275 Diskette #5.

Q11. Press "RETURN" when ready to proceed [S]:

The system will load the software from 2275 Diskette #5 and dismount the volume (you will see the dismount message). You will then be instructed to remove 2275 Diskette #5 from FW0: and to insert 2275 Diskette #6.

Q12. Press "RETURN" when ready to proceed [S]:

The system will load the software from 2275 Diskette #6.

The 227X Digital Test Library was split using BSU over Diskette #6 and #7. You will be instructed how to answer the prompts from BSU, while BSU is merging the Library back together, with the following message:

```
;       Loading 2275 Digital Library...
;
;            The BSU (GenRads Split/Merge Utility) is used to merge the
;       227X Digital Test Library from Diskettes #6 and #7.  BSU will first
;       prompt you for the "BACKUP VOLUME NAME", to which you should press the
;       "RETURN" key.  You will then be asked "READY TO CONTINUE", to which
;       you should enter "Y", then press the "RETURN" key.  When BSU is ready
;       for Diskette #7, you will be prompted with "READY TO CONTINUE" again,
;       and after removing Diskette #6 and loading Diskette #7 you should
;       enter "Y", then press the "RETURN" key.
```

BSU will complete and dismount Diskette #7 (you will see the dismount message). You will then be instructed to remove 2275 Diskette #7 from FW0: and store the 2275 Master Distribution Diskettes in a safe place.

When the loading procedure is complete you will be notified and the final System Image will automatically boot and execute the Normal Startup Procedure.

Normal Startup Procedure

After system software has been downloaded onto the Target disk, the system will perform a "normal" startup each time it is booted. This consists of setting the Time and Date, setting the device attributes, allocating checkpoint space, mounting devices, and finally bringing up the 2275 monitor.

If you add a GenRad layered product to the 2275 (i.e., Foreground-Background option, GRnet, etc.) these products will automatically add themselves to the Normal Startup Procedure. Therefore, on future boot-up, the layered product will come up and be ready for use without any intervention.

2275 Foreground/Background Option

If you have purchased the F/B option for your 2275, the following simple steps will guide you through loading the F/B option.

a. Download 2275 System software as specified in this document.

b. When the finished System boots into the monitor, exit the monitor by typing "ABO".

c. Load the F/B option Floppy diskette into the Floppy drive (FW0:).

d. Enter the following MCR instructions to move the software:

```
>MOU FW0:2275BACK
>@FW0:2275BACK
```

e. After successful completion of Step #4, simply re-boot the 2275 tester to enable the F/B option. The software will automatically install and the background terminal will log into [200,201].

2.4 229X PROGRAM PREPARATION SOFTWARE

2.4.1 Introduction

The 229X Central Stations are useful for 227X test-program development. The central stations use a DEC[1] PDP-11 processor and DEC RSX-11M operating system software to time-share tasks and resources for multiple users at one time. Basic interface to the processor is provided by DEC VT100 Video Display Terminals. A Printronix[2] Line Printer and DEC LA36 or LA120 DECwriter terminal are optional accessories. Files can be transferred directly from central stations to the 227X via floppy diskettes by using the SPLit/merge monitor page (refer to Section 3).

The purpose of the 229X Central Stations is to generate test programs, permitting the Board Test Workstations to be dedicated to production line testing. To accomplish this task, the 229X Central Stations are equipped with RSX-11M operating system software to control system operations and to manipulate files and disks. In addition to the RSX-11M software, the following user tasks are also installed:

1. The editors include a GenRad version of the DEC TECO-11 editor and a DEC Editor EDT (ED2) for general editing purposes.

2. DEC file and directory utilities, including the Peripheral Interchange Program (PIP) to delete, copy, and rename files and to list file directories, etc. Also included is a Sort Directory Utility (SRD) used to generate directory listings in alphanumeric order.

3. GenRad 227X Development Applications Software (DEVSYS) is installed on the system. This software operates exactly as the software on a test system, except for the following differences.

    a. All Monitor Modes are available on the 229X Central Stations, but some o12 these modes (those that are part of Diagnose page) are disabled. Test-program preparation can be completed through

---

[1] The terms DEC, PDP, and RSX are trademarks of the Digital Equipment Corporation, Maynard, MA 01745 .
[2] Printronix Corp., 17421 Derian Ave., Irvine, CAL 92714.
[3] Control Data Corp., 4000 NW 39th St., Oklahoma City, OK 73112.

TRAnslate mode and .OBC and .SMT files generated. Though Diagnose mode is entered when the monitor is invoked, test program files cannot actually be run, since there is no test hardware.

b. Users on the 229X Central Stations must specify UICs (refer to the 229X User's Guide) with input and output file specifications when working on a UIC other than their own.

c. The GRnet networking system is optional.

To run the 227X Development System Release 7.4 software for the first time (after the software is loaded and installed on the Central Station), enter the command:

```
>@LB1:[2,10]227XMOVE
```

This command invokes an indirect command file that initializes the Monitor and transfers another indirect command file (named 2270.CMD) to your default UFD and system device (SY:). After first-time initialization of the DEVSYS software, the command:

```
>@2270
```

can be used to initialize the monitor for the 229X Central Station user.

If the system fails to invoke the file 2270.CMD, or if 227X initialization does not occur, check to make sure that 227X applications tasks were correctly loaded during the 229X Central Station system startup. If LB1: data were lost, refer to the software installation procedure to reload data on LB1:. Use the master disk cartridge supplied with the system or a user-made backup disk to reload the software on to the LB1: surface.

Type EXIt, SHUt, or ABOrt to exit from the 227X monitor.

2.4.2 Loading the DEVSYS Software

This paragraph describes the procedures for loading the DEVSYS software on a 2294 Central Station.

Loading via Phoenix Drives

The Release 7.4 DEVSYS software is shipped on a Phoenix cartridge that is loaded into the Allocatable Port which is either AL0: or AL1:, depending on configuration (refer to the 2294 User's Guide). To load the DEVSYS software on a 229X system with Phoenix disk drives:

a. Load the DEVSYS disk into the ALn: (either AL0: or AL1:, as appropriate) drive, and spin the drive up.

b. Log-on to a privileged account (system manager's account can be used). When the ALn: drive is spun up, issue the commands:

```
>ALL ALn:
>MOU ALn:2270
>@ALn:[2,10]227XMOVE
```

c. The loader asks:

```
>* WHERE IS THE 227X DISTRIBUTION PHOENIX? <D.AL0:>
```

If the disk is in AL0: press RETURN, otherwise answer with the device that the disk is in (ALn:).

d. The loader next asks:

```
>DESTINATION DEVICE FOR THE 227X PROGRAM PREP. SOFTWARE? <D.LB1:>
```

The DEVSYS software is normally loaded on to LB1:. If you want the software to be loaded on to any other device, answer with that device. If you want the software to be loaded on LB1: answer this question by pressing RETURN.

e. The loader now asks four questions about which ATG libraries you want loaded on to the destination disk (from question d):

```
; ONLY THE FOLLOWING ATG TEST LIBRARIES REQUESTED WILL BE
; DOWNLOADED
>* Analog Test Library Source (.LBS)? <D.NO>
>* Analog Test Library Object (.LIB)? <D.YES>
>* Analog Component Library Object (.ACL)? <D.YES>
>* Digital Test Library Object (.DTL)? <D.YES>
```

Answer each of the questions Yes or No, as appropriate. Normally, all the libraries are needed for ATG program development. The Test Library Source is only needed if you are going to be developing Analog Test Library procedures.

f. The loader next displays the message:

```
; THE FOLLOWING QUESTION, IF ANSWERED "YES," WILL DELETE ANY AND ALL
; EXISTING 227X PROGRAM PREP. SOFTWARE FROM LB1.  YOU MAY ANSWER "NO"
; IF YOU WANT TO KEEP AN OLDER RELEASE ON THE SYSTEM.
```

before asking the question:

```
> CLEANUP EXISTING 227X PROGRAM PREP. SOFTWARE ON LB1:? <D.NO>
```

(If you answered the question in step d with a device other than LB1:, the question indicates the device you selected.) Answer the question Yes or No. Normally the question is answered Yes, unless you wanted an older release of 227X DEVSYS software to remain available on the system.

g. The command file performs the software loading, and displays a message when the procedure is done. Remove the distribution disk and store it in a safe place.

2.4.3 Loading the 2293

This paragraph describes the procedures for loading the DEVSYS software on a 2293 Central Station.

LOADING 227X RELEASE 7.4 PROGRAM PREP. SOFTWARE ON A 2293 CENTRAL STATION

To load the Release 7.4 software, the following steps should be performed:

a. Place the first floppy diskette in the FW0: drive.

b. Mount the diskette:

```
MOU FW0:2270A
```

c. Run the software loading command file:

```
@FW0:[2,10]227XMOVE
```

The following is a brief summary of the questions that will be asked when down-loading 227X Program Prep. Software:

Q1. Where is the 227x Distribution Diskette <D. FW0:>

Enter the device where the load procedure is running from. The default is FW0:.

Q2. Destination Device for the 227x Program Prep. Software <D. LB1:>

Enter the device where the load procedure is to be down-loaded. The default is LB1:.

```
;
; Only the following ATG Test Libraries requested
; will be downloaded onto LB1:.
;
```

Q3. Analog Test Library Source (.LBS) <D. NO> [Y/N]:

Q4. >* Analog Test Library Object (.LIB) <D. YES>? [Y/N]:

Q5. >* Analog Component Library Object (.ACL) <D. YES>? [Y/N]:

Q6. >* Digital Test Library Object (.DTL) <D. YES>? [Y/N]:

Answer the Library questions "Y" for YES or "N" for NO. The defaults are inside the angle-brackets "<D. YES>".

```
;
;    The following question, if answered "YES", will delete any and
;    all existing 227X Program Prep. software from LB1:.  You may
;    answer "NO" if you want to keep an older Release on the system.
;
```

Q7. Cleanup existing 227X Program Prep. software on LB1: <D. NO>

If the question is answered "Y", for YES, all files in the uic's [2,10] and [2,11] on the destination device will be deleted. The default is "N", for NO.

If Cleanup is answered "Y", then the following message will appear:

```
;
;    Deleting existing 227X software on LB1:...
;
```

You will then be instructed to remove Diskette #1 from FW0:, and insert Diskette #2.

Q8. Press "RETURN" when ready to proceed

The system will load the software from Diskette #2, and dismount the volume (you will see the dismount message). You will be instructed to remove Diskette #2.

If any of the Libraries are to be down-loaded, you will be instructed to insert Diskette #3.

If the Digital Library is to be down-loaded, the following message will appear:

```
;
;
;       Loading 2293 Digital Library...
;
;           The BSU (GenRads Split/Merge Utility) is used to merge the
;       227X Digital Test Library from Diskettes #3 and #4.  BSU will first
;       prompt you for the "BACKUP VOLUME NAME", to which you should press the
;       "RETURN" key.  You will then be asked "READY TO CONTINUE", to which
;       you should enter "Y", then press the "RETURN" key.  When BSU is ready
;       for Diskette #4, you will be prompted with "READY TO CONTINUE" again,
;       and after removing Diskette #3 and loading Diskette #4 you should
;       enter "Y", then press the "RETURN" key.
;
SET /UIC=[2,11]
BSU LB1:/MER=FW0:[2,11]DIGLIB740.DTL
```

BSU will complete and dismount Diskette #4 (you will see the dismount message). You will then be instructed to remove Diskette #4 and store the 227X Program Prep. Diskettes in a safe place.

System Software Management - Section 3

3.1 MCR/VMR

3.1.1 Introduction

MCR and VMR refer to command languages that control the RSX-11M system. During normal program preparation, the average user would have very little exposure to MCR and no exposure to VMR. GenRad provides monitors to invoke many of the actions of MCR. The system manager may, however, be directly involved with MCR and VMR in order to adapt the facility to specific needs. This paragraph introduces the basic MCR and VMR commands you should know.

3.1.2 Purpose of MCR and VMR

MCR (Monitor Console Routine) is a command dispatcher that provides an operator interface to RSX-11M. MCR is used for setting system characteristics, running programs, mounting disk devices, logging on and off, etc. The commands, with few exceptions, operate on the executive when it is in main memory.

VMR (Virtual Monitor Routine) provides many of the commands supported by MCR. Unlike MCR, however, VMR operates on the image copy of the system on disk. VMR is used primarily to make permanent changes to the system. MCR is used to control dynamic performance of the system and to make temporary changes to the system which go away when the system is rebooted. VMR changes do not take effect until the system is rebooted.

MCR and the MCR commands are documented in the DEC RSX-11M/M-PLUS MCR Operations Manual. Those VMR activities that you will need to know are described in this guide. A complete VMR command description is described in the DEC RSX-11M System Generation and Management Guide.

The concept of a privileged terminal is fundamental to MCR. Foreground/background systems support multi-user protection (HELLO, BYE), and individual user group numbers determine whether the terminal will be privileged or unprivileged. Any user who logs onto the system (types HELLO) with a group number of less than or equal to 10 is a privileged user and the logged-on terminal is a privileged terminal. Terminals can also be assigned privileged or unprivileged status during system generation or through use of VMR. Privileged users can change the privilege status of a terminal by using the MCR SET /PRIV and SET /NOPRIV commands. Terminals that are logged on by non-privileged users are non-privileged terminals, unless a privileged user changes the terminal to privileged status from another terminal after the log on.

Privileged capabilities are not available to non-privileged users. Basically, privileged users have unlimited access to the system and the ability to change or alter many system functions, while non-privileged users do not.

Many MCR commands are partially or completely privileged, that is, they can only be initiated from a privileged terminal. Privileged commands can destructively interfere with system operation and with each other.

3.1.3 Common Commands

This section highlights MCR commands with which you should be familiar. Refer to the MCR Operations Manual for complete documentation of the command format required. Use the descriptions in this section only as a guide because complete examples and keywords are not always provided.

MCR commands must be entered at the MCR level. All unsolicited input is assumed to be an MCR command. This "feature" sometimes causes some problems on heavily loaded systems when information is entered for a program before the program is ready for it. To insure you are at MCR, type a CTRL C and you should see a MCR prompt (MCR>). These procedures are fully described in the DEC MCR Operations Manual.

Each description that follows lists the command, indicates whether or not it is supported under VMR or MCR only, and gives a brief statement of its function, how it would be useful to you, and some points you should be aware of. Unless otherwise indicated, all commands are for use by both privileged and non-privileged users.

ABO (MCR only)

ABORT

ABO allows you to terminate the execution of an indicated task.

ABO is a command that you must be familiar with because it is the only way you can stop a program that has gotten out of control. Non-privileged users can only abort tasks that they have started. Privileged users can abort any task running at any terminal in the system. Never abort the task F11ACP because you run the risk of corrupting your mounted volume.

When using ABO, specify the task name completely. For example, if a second PIP task is running from terminal TT1:, the complete task name will become PIPT1. Use ACT to determine the correct task name to be aborted.

To abort a task, you must first gain access to the MCR prompt (with CTRL C). When MCR has been entered, the ABO command can be issued. For example, the command:

```
>ABO PIP
```

will abort the PIP task after the RETURN key is pressed.

ACS (MCR only)

Allocate Checkpoint Space

Privileged only

ACS allocates or discontinues a checkpoint file on disk for checkpointable tasks. ACS is required at system start-up to allocate checkpoint space for checkpointable tasks. ACS is invoked by SHUTUP at system shutdown to discontinue checkpointing.

You will encounter ACS if you decide to make the checkpoint file larger or smaller or move it to another disk, and when copying the system disk (checkpointing must be disabled).

ACS commands take the form:

```
>ACS LB2:/BLKS=200.     (allocate 200. blocks for the checkpoint
                         file on LB2:)
>ACS LB2:/BLKS=0.       (discontinue checkpointing)
```

NOTE

GenRad has assigned 512. (800. for Foreground/Background systems) blocks for checkpoint space on LB2:. This assignment should not normally be modified.

ACT (MCR only)

ACTIVE

ACT displays the names of all the active tasks.

ACT is used frequently to determine what is happening. ACT by itself displays active tasks initiated at a particular terminal. Typing ACT to an idle terminal is a good way to determine whether or not the terminal is being used. The /ALL switch is useful to determine what tasks are active from all terminals.

ACT will usually show ...MCR and MCR... active, because they display the active tasks on the terminal.

Some useful ACT commands include:

```
>ACT                    Displays terminal-initiated active tasks.
>ACT /ALL               Displays all active tasks.
>ACT /TERM=TTn:         Displays all active tasks for terminal TTn.
```

ALL (MCR only)

ALLOCATE

ALL establishes a specified device as a user's private device (no one else may access it). Public devices or other users' private devices cannot be allocated.

ALL is used quite heavily by all users if one or more disk devices are to be reserved as private scratch areas.

ALLocate commands take the form:

```
>ALL ALO:               Allocate ALO: as a private device.
```

ASN (MCR and VMR)

ASSIGN

ASN defines, deletes or displays logical device assignments, and is a very important command with which all users should be familiar. ASN is commonly used to assign a physical device as the user's default or system device.

Examples of useful ASN commands include:

```
>ASN                    Display device assignments.
>ASN DKn:=SY:           Assign the pseudo device SY: to DKn:
                        until the user logs off the terminal.
>ASN =                  Cancel all local assignments.
>ASN FW2:=MD:/GBL       Assign FW2: as the global device MD0:.
```

BOO (MCR only)

CAUTION

The BOOt command should be issued only by the system manager. It should never be issued while other users are operating the system as it terminates the system currently operating and boots in another one, with a possible loss of data.

BOOT

Privileged only

BOO loads a system image from a Files-11 volume and transfers control to the system. It also provides a convenient means of terminating one system and initiating another.

BOO is useful to load or boot in a system that is on another disk device. You would do this when you need to back up your system device.

BYE (MCR only)

BYE

BYE and HEL are the log off and log on commands, respectively.

BYE logs a user off the system, and dismounts and deallocates any devices that a user allocated and mounted.

DEA (MCR only)

DEALLOCATE

DEA, the partner to ALL, releases a private (allocated) device to allow other users to access it. A deallocate automatically occurs with a BYE.

DEA commands take the form:

```
>DEA ALO:
```

DEV (MCR only)

DEVICES

DEV displays the symbolic names and status of all devices. DEV, a command all users should be familiar with, can show what UICs are logged onto which terminals and can show whether or not a private device has been allocated to another user.

For example, the commands:

```
>DEV           Lists all devices.
>DEV DK:       Lists all DK: devices.
>DEV DM1:      List only DM1:.
>DEV /LOG      Lists all logged-on terminals.
```

DMO (MCR only)

DMOUNT (dismount)

DMO declares that the volume specified in the command is dismounted and not accessible.

All users will use DMO if your system has private allocatable devices. Otherwise, it will be used only by privileged users.

Get in the habit of always DMOing a disk before you spin it down. Otherwise, the system will think the old volume is still mounted and you run some risk of corrupting a new disk that you put in the drive.

DMO commands take the form:

```
>DMO ALO:      Dismount the ALO: volume from TI:.
>DMO DM1:/DEV  Dismount the DM1: volume from the system or
               dismount public devices, i.e., SC: or SR:, etc.
               (Privileged only)
>DMO /USER     Dismount all devices mounted from TI:
```

HEL (MCR only)

HELLO

HEL logs a background user onto a terminal to gain access to the system.

HEL and its companion command BYE log background users onto and off the system. HEL looks into the system account file to determine whether or not the UIC and password are valid. If they are, it displays the contents of [1,2] LOGIN.TXT on the terminal and completes the log in.

Incorrect entries or look-up failures on the account file can cause problems with HEL.

Examples of logging-on with HELLO commands:

1. >HELLO JONES
   PASSWORD: X

2. >HELLO
   ACCOUNT OR NAME: JONES
   PASSWORD: X

3. >HELLO JONES/X

INI (MCR only)

INITVOLUME

INI creates a Files-11 volume data structure on a disk.

All users may use INI if your system supports private allocatable devices. Otherwise, it is a privileged command. INI is essential when installing a file structure on a new disk. INI follows formatting and running BAD and precedes mounting and creating UFDs.

Remember to format a new disk before you try to INI it. You will need to specify a volume label. Use defaults for all the other switches, except the maximum file count (MXF) switch, and for Phoenix disks use the switches:

```
/LRU=20./EXT=10.
```

It is not necessary to use INI on a new disk if the data will be put on the disk with DSC.

INI deletes all data on a disk!

INI commands take the form:

```
>INI ALO:2270   (/BAD=AUTO is the default, disk name is 2270)

>INI ALO:TEMP/LRU=20./EXT=10.    (Phoenix disk)
```

INS (MCR and VMR)

INSTALL

Privileged only

INS makes a specified task known to the system.

This command is essential for the management of your system because INS is the only way to install programs in your system.

The most useful keywords are CKP to make the task checkpointable, INC to increase the task size when it is installed in a system-controlled partition, PRI to adjust the running priority, and TASK to change the installed task name. INS commands take the form:

```
>INS $BAD       Install the task BAD.
```

LOA (MCR and VMR)

LOAD

Privileged only

LOA reads a nonresident device driver into memory and constructs the data base and interrupt linkages required to allow access to the device.

LOA is a command that you probably will use very infrequently and then probably only with VMR.

MOU (MCR only)

MOUNT

MOU logically makes the specified volume accessible and associates it with F11ACP.

All users will use MOU if your system has private allocatable devices. Otherwise it will be used only by privileged users. MOU reads the home block of the volume, runs F11ACP, if necessary, and creates volume control data blocks in F11ACP. Public devices must be mounted from a privileged terminal. Non-public (private) devices can be mounted to specific terminals, unless allocated by another terminal. Devices mounted in this manner can also be dismounted from one terminal while remaining mounted for another terminal.

You must specify a volume name when you mount. If you don't know the volume name, find a privileged terminal and mount the volume, using the /OVR switch to override the volume name and /VI to list the volume identification.

Examples of MOU commands:

```
>MOU DK2:2270
>MOU DM1:/OVR/VI      (Privileged only)
```

OPE (MCR only)

OPEN REGISTER

Privileged only

OPE allows one to examine the contents of locations in main memory and to make optional changes. It is useful for patching code, such as executive code, once it is in main memory.

The ZAP patching utility performs the same function on task and system images on disk.

PAR (MCR only)

PARTITION DEFINITIONS

PAR displays the description of each memory partition in the system. PAR provides you with some basic information about the systems in the form of a partition listing.

PAR commands take the form:

```
>PAR
```

RED (MCR and VMR)

REDIRECT

Privileged only

RED allows you to redirect all I/O requests previously directed to one physical device-unit to another physical device-unit.

RED is one of the fundamental commands with which you should be familiar. You will use RED in two cases: Redirect I/O from one device to another when the first device is down; redirect console messages to another terminal. For example, to redirect console messages to TT2:, the command is:

```
>RED TT2:=CL0:
>RED TT2:=CO0:
```

To remove a redirect, redirect a device to itself. Remember that the command is new device = old device.

REM (MCR and VMR)

REMOVE

Privileged only

REM deletes a task name from the system task directory and thereby removes the task from the system.

REM is the companion of INS, which makes tasks known to the system. Do not remove INS.

RUN (MCR and VMR)

RUN

RUN initiates the execution of a task.

The basic RUN command is essential for all users of the system. The /RSI and /UIC switches in the "RUN immediately" form are not needed. The install, run immediately, and remove on exit also will be widely used. Useful switches are /CKP, /INC, /PRI, and /TASK.

SAV (MCR only)

SAVE

Privileged only

SAV writes into a task-image file the image of an RSX-11M system that has been resident in main memory.

SAV /WB is the last step in an RSX-11M SYSGEN. The /WB switch writes out a boot block on block 0 of the target disk which will point to the system image file on disk. Then the entire core image, including SAV task itself, is written out to the disk. The saved system is then automatically rebooted.

If you lose your boot block, you can recreate it by booting your system from another running system with BOO and then doing a SAV /WB.

SET (MCR and VMR)

SET

SET allows the user to alter dynamically a number of system-wide and local terminal characteristics. All users should be familiar with the following commands to set their terminal characteristics.

/BUF	(sets the width of the terminal display)
/CRT	(enables the backspace delete option)
/LOWER	(enables lower case letters)
/NOLOWER	(disables lower case letters)
/SPEED	(adjusts terminal transmit and receive speeds)
/UIC	(changes default UIC)

For example, to enable lower-case characters at your terminal, type:

```
>SET /LOWER=TI:
```

To change your default UIC to [200,200], type:

```
>SET /UIC=[200,200]
```

To find out who is using an unmanned terminal, type:

```
>SET /UIC
```

The system manager should also be familiar with:

/PRIV	(set a terminal to privileged status)
/NOPRIV	(set a terminal to non-privileged status)
/PUB	(set a device to public)
/NOPUB	(set a device to non-public)
/LOGON	(enable log-ons)
/NOLOGON	(disable log-ons)
/MAXEXT	(set the maximum size to which any task on the system can extend)

TAS (MCR only)

TASKLIST

TAS displays a description of each installed task, and provides information about your system.

TIM (MCR only)

TIME

TIM allows a user to display the time and day and the operator to set the system time and date.

TIM is an essential operator command after every system boot to set the executive time and date. The command is included in the start-up indirect command file.

To display the time of day, enter the command:

```
>TIM
```

UFD (MCR only)

USER FILE DIRECTORY

UFD creates a User File Directory on a Files-11 volume.

UFD, an essential command for building and maintaining disk volumes, puts UFDs for specified UICs on the volumes. The default specifications established for the keywords /ALLOC and /PRO are more than adequate.

UFD must be run after INI to create directory files before you use a new disk.

A UFD command to create directory [200,200] on DK4: takes the form:

```
>UFD DK4:[200,200]
```

Don't forget to use UFD to put a user file directory on all the user disks after you install a new user log-in account.

UNL (MCR and VMR)

UNLOAD

Privileged only

UNL, the companion to LOA, removes a loadable device driver from memory.

Do not UNL TT, the terminal driver, and DK, DM, FW, or DY drivers for the system devices.

3.2 UTILITIES

This paragraph describes utilities that operate under the RSX-11M operating system. Utilities are supported by MCR only. Many of the commands that are described here are also available for non-privileged use. Some of these commands are implemented by 227X monitor modes. Refer to the appropriate System Operation manual.

FLF

FLOPPY FORMATTER (2270, 2271, and 2272 only)

FLF is a GenRad utility program that formats floppy diskettes to Files-11 format. This utility is used when a floppy diskette has been formatted to other than Files-11 format or has been magnetically destroyed. To use this formatter, enter the command:

```
>FLF DYn:
```

After loading a diskette. Answer Yes to the CONTINUE question, and wait until the formatter has completed the formatting and checking operation for bad blocks. The diskette can then be initialized, mounted, and have UFDs placed on it. To get help using FLF, enter the command:

```
>FLF /HLP
```

After the help message is displayed, FLF will be entered (FLF> prompt). This is the utility that is performed when the DFORMAT page, with DYn: selected, is run.

FMT

FORMAT

FMT formats disks. It can be used by any user. To use this utility, load the disk or diskette, allocate the device, and enter a command in the form:

```
>FMT DEV (without bad-blocking performed)
>FMT DEV/BAD (with bad-blocking performed)
```

(DEV can be DMn:, FWn:, DKn: or DYn:). The system will warn that all data will be lost on the device and ask:

```
CONTINUE [Y/N]:
```

Answer Yes to continue. After formatting is completed (and the number of bad blocks found has been given, if /BAD switch is used) the disk must be INItialized, labeled, and mounted. UFDs are placed on it before use.

If the device is a Phoenix disk, you must also use /VE and /WLT options before bad-blocking can be used. These switches insure that a "last-track" is placed on the disk where bad-block information can be located. For this device the command looks like:

```
>FMT DMn:/VE/WLT=1/BAD
```

NOTE

For floppy diskettes, FMT assumes that a diskette has been pre-formatted (by the manufacturer) to IBM 3740 standard (also known as DEC RX01). If FMT is used to format a floppy diskette that is not IBM 3740 compatible, or has been magnetically destroyed, the diskette will not work in any GenRad 229X or 227X system. Use FLF to format these diskettes.

TCU

CLOCK SET UTILITY

TCU is the program which is used to set, read, or check the time on the clock board, if the time-of-day clock option is selected on a 2275 system. The TCU utility has 5 functions, as follows:

SET — The TCU SET function is used to set the time for the clock board. This will normally need to be done the first time that the system is brought up, when changing from Standard time to Daylight Savings time, or whenever the system is turned off and power is completely removed. To use the SET function requires a command of the form:

```
>TCU SET hh:mm dd-mmm-yy
```

(the time to be set is represented by hh:mm dd-mmm-yy). An example of this command is:

```
>TCU SET 15:35 12-JUL-83
```

UPDate — The TCU UPDate function is used to update the time for RSX-11M. This function will most commonly be used for system start-up (it is included in the STARTUP.CMD file if CONFIG.DAT indicates that a time-of-day clock is present in the system). The command is:

```
>TCU UPD
```

When the command is issued, the system reads the time from the clock board, and RSX sets the CPU clock for the system.

REAd — The TCU REAd function is used to read the time and date from the clock board, and print or display them. The command is:

```
>TCU REA
```

As an example, the system will respond with:

```
TIME 15-JUL-83 15:52:08
```

CONfigure — The TCU CONfigure function is used to list the CSR and vector assignments and status of the TCU-150 unit. The command is:

```
>TCU CON
```

The system responds by showing the information listed below. For example:

```
TYPE = TCU150, STATUS = ONLINE, CSR = 160770, VECTOR = 170
```

HELp — The TCU HELp function is used to display a help message for the TCU utility. The command is:

```
>TCU HEL
```

3.3 USING VMR TO CHANGE SYSTEM CHARACTERISTICS

We suggest using VMR to change the system image. The general procedure is described below.

CAUTION

USED INDISCRIMINATELY, VMR CAN CAUSE DESTRUCTIVE RESULTS. GenRad RECOMMENDS THAT YOU DO NOT USE VMR UNLESS YOU ARE THOROUGHLY FAMILIAR WITH VMR OPERATIONS. DISCUSS YOUR VMR APPLICATION WITH A GenRad SOFTWARE SUPPORT GROUP BEFORE ATTEMPTING TO USE VMR. THE EXAMPLES OF VMR USE CONTAINED IN THIS MANUAL ARE FOR DISCUSSION PURPOSES ONLY.

VMR IS DESIGNED TO OPERATE ON YOUR RSX11M.SYS. NEVER RUN VMR ON YOUR COPY OF RSX11M.TSK. NEVER DELETE RSX11M.TSK OR RSX11M.STB. NEVER DELETE YOUR CURRENT RSX11M.SYS

To operate on your RSX11M.SYS with VMR, you must have a copy of RSX11M.STB in the same UIC with RSX11M.SYS. The file ending with the extension .STB is the symbol table file for the system image. VMR accesses that file to find locations in the system image.

a. Log on to a privileged UIC or work from a privileged terminal.

b. Use the SET /UIC command to set the UIC to [1,54]. Be sure that the physical disk that contains the system is the default system disk. Use the ASN command to check this and, if necessary, ASN the disk to SY0: and to LB:.

c. Type RUN $VMR, and VMR should respond with an ENTER FILE NAME prompt. Enter filename RSX11M.SYS and press the RETURN key.

d. Make the desired changes to the system.

e. When you are finished, type CTRL Z to exit. NEVER ABO VMR BECAUSE YOU MAY CORRUPT YOUR SYSTEM IMAGE (refer to RSX-11M System Generation and Management Guide).

A typical set of commands and responses might include:

```
>ASN DK0:=LB:
>ASN DK0:=SY:
>SET /UIC=[1,54]
>RUN $VMR
ENTER FILE NAME: RSX11M.SYS
VMR>                          (Run VMR)
VMR>^Z                        (Use CTRL Z to exit)
```

Why use this method? First, it is a good idea never to install VMR. This protects you from accidents. Second, VMR, RSX11M.SYS and RSX11M.STB should all be in [1,54] on the system or boot disks. Operating from a privileged terminal will allow the "RUN $VMR" to work, because VMR can only be installed from a privileged terminal. Third, you must have the disk containing the system act as the default device (SY0:) for INS commands to work properly within VMR. Tasks installed with VMR must be installed from device SY0: so that those tasks can be found at system start-up.

For example, change the running priority of the task PIP as follows.

```
>SET /UIC=[1,54]                !Set to system UIC from a privileged UIC.
>RUN $VMR                       !Run VMR
ENTER FILENAME:  RSX11M.SYS     !Specify RSX-11M
VMR>REM PIP                     !Remove the PIP task.
VMR>INS PIP /PRI=55.
VMR> ^Z  (CTRL Z)               !Exit VMR
```

Until it is changed again by VMR, the priority for PIP will be 55 when the system is booted.

3.4 INDIRECT COMMAND FILES

Indirect command files are those that contain commands to programs which would ordinarily be entered from a terminal. A sample indirect file is STARTUP.CMD on [1,2] on your system's disk. Most users will never use an indirect command file. The system manager, however, may find a few simple indirect command files quite helpful.

The RSX-11M/M-PLUS MCR Operations Manual describes the construction of indirect command files in much more detail than you ever need to use. Of the constructs described, the .LABEL, .ASK to get a true or false response, .SETN or .SETS to assign a value, .IFT/.IFF if true or false, and .GOTO are the most useful.

Indirect command files are useful in managing your system because you can prepare files containing MCR commands to do set procedures. In the simplest case, the command file contains only MCR commands. To invoke a command file, type @ followed by the file name. For example, to invoke LB:[1,2]STARTUP.CMD the command is:

```
@LB0:[1,2]STARTUP
```

A few simple examples illustrate how indirect command files are used.

Assume we want to automate the back up of DK4: and DK5: by copying them to DK6: and DK7: using DSC. First, create an SRBACKUP.CMD file, which contains only MCR commands:

```
DMO DK4:/DEV            !Dismount just in ...
DMO DK5:/DEV            !...case they were mounted
ALL DK6:                !Allocate the private...
ALL DK7:                !...devices to me
DSC DK6:=DK4:/BL=32.    !Back up DK4:
DSC DK7:=DK5:/BL=32.    !Back up DK5:
DEA DK6:                !Deallocate the private ...
DEA DK7:                !...devices
MOU DK4:2270            !Remount DK4:  Volume ID=2270
MOU DK5:2270            !Remount DK5:  Volume ID=2270
```

Put SRBACKUP.CMD into [5,10] on the system device (LB:). Then invoke the SRBACKUP.CMD file by typing;

```
@LB:[5,10]SRBACKUP
```

However, we probably want to be able to override the automatic backup. We can, by adding .ASK, .GOTO, .LABEL. The file now looks like this:

```
.ASK NOBACK DO YOU WANT TO BACKUP
.IFF NOBACK .GOTO 100
DMO DK4:/DEV
DMO DK5:/DEV
ALL DK6:
ALL DK7:
DSC DK6:=DK4:/BL=32.
DSC DK7:=DK5:/BL=32.
DEA DK6:
DEA DK7:
MOU DK4:2270
MOU DK5:2270
.100:;
```

The first two lines and the last line are new. If the operator answers No to the .ASK question, the system branches to the last line of the file.

Now that there is some interaction between the system and the operator, we could expand the file, giving some instructions to the operator and waiting for some responses. We can display information by using comments. (Comments are lines that start with a semicolon or exclamation mark.)

So far we have assumed that the cartridge in DK6:/DK7: is a scratch disk instead of a valuable data pack and that the drive is up to speed. Let's add some instructions to the file that ask the user to be sure the backup cartridge is in the drive and the drive is spun up. When we are finished, we will want the operator to remove the backup pack and install a scratch pack. The command file now looks like this:

```
.ASK NOBACK DO YOU WANT TO BACKUP
.IFF NOBACK .GOTO 100              !branch if NO
;
;PLEASE PUT THE BACKUP CARTRIDGE IN DK6: AND DK7:
;AND SPIN UP THE DRIVE
;
.30:
.ASK UPYET IS THE DRIVE READY WITH BACKUP
.IFF UPYET .GOTO 30
DMO DK4:/DEV
DMO DK5:/DEV
ALL DK6:
ALL DK7:
DSC DK6:=DK4:/BL=32.
DSC DK7:=DK5:/BL=32.
DEA DK6:
DEA DK7:
;
;PLEASE REPLACE THE BACKUP CARTRIDGE WITH A
;SCRATCH CARTRIDGE AND SPIN UP THE DRIVE.
;
.60:
.ASK UPYET IS THE DRIVE READY WITH A SCRATCH
.IFF UPYET .GOTO 60
MOU DK4:2270
MOU DK5:2270
.100:;
```

In the last example we used comment lines to give instructions to the operator. We used the questions and a loop construct to force the indirect command file to wait until the operator indicates that the drive is ready.

System Access - Section 4

4.1 INTRODUCTION

This section describes two 227X system features that control access to the system. The first of these features are login accounts and the log-on/log-off mechanism of RSX-11M which provides multi-user protection for the system and files. The other feature is the LIMIT/UNLIMIT keyword which protects the system against unwanted access to RSX-11M and prevents an operator from doing any action except board testing. The information about the log-on/log-off mechanism is particularly useful if you are using a 227X Foreground/Background system.

4.2 LOGIN ACCOUNTS

4.2.1 General

Login Accounts provides both a tool for managing access to your 227X system and the basis for multi-user protection on RSX-11M systems. Multi-user protection provides safeguards against accidental interference of one user by another. Material in this section is based on information in the RSX-11M/M-PLUS MCR Operations Manual.

4.2.2 HEL, BYE, LOGIN.CMD and LOGIN.TXT

HEL and BYE are the MCR commands used to gain access to the system and to leave the system. LOGIN.TXT is a message file that is displayed at a terminal as part of the log-in action. LOGIN.CMD is an indirect command file that can be automatically invoked at log in.

In response to a HEL command, the system prompts for an account or name and a password. It then looks into the system Account File to determine whether or not it is a valid account. If it is, then it sets the logical name SY: to the user's system disk, as specified in the account file. The system then displays the LOGIN.TXT file. It looks into the user's UFD on his system disk (SY:) for an indirect command file named LOGIN.CMD. If one exists, it invokes LOGIN.CMD; otherwise, it returns directly to MCR.

The MCR command BYE is issued when a user wants to log off. The purpose of BYE is to clean up system tables, to dismount all mounted private devices and to abort all nonprivileged tasks requested from the terminal. Please note that BYE does not abort PRT..., the print spooler.

The use of LOGIN.CMD is optional but provides a tool to automate a sequence of MCR commands that are unique to a user. One example would be to run an applications task automatically when a specific user logs in. The only requirement is that the indirect command file, LOGIN.CMD, must be in the user's UFD on the default system device.

LOGIN.TXT is a text file stored in LB:[1,2] that contains text to be displayed on each terminal as part of the log-in. This file provides a tool for displaying important information for the users. To change the text, log in under a privileged account and edit LOGIN.TXT in LB:[1,2]. Since the message will scroll on a CRT display, the most important or latest messages should be at the end so that they will remain on the screen for the user to see.

To log on the background terminal, type:

```
>HEL GR2270/BACK
```

To log on the foreground terminal, type:

```
>HEL GR2270/TESTER
```

In both cases, the system will invoke the command file LOGIN.CMD from the system device of the login account, causing the terminal to come up in the appropriate mode (i.e., foreground or background).

Privileged users can log on only from the foreground terminal. The foreground terminal is always enabled for privileged log on after booting the system.

NOTE

Avoid logging-on to the wrong account (for example, don't type HEL GR2270/TESTER from the background terminal) as this may interfere with operation the monitor system for the other terminal.

4.2.3 Login Accounts and Protection Mechanisms

The key to HEL is the System Account File, which is described in Chapter 2 of the DEC MCR Operations Manual. The multi-user protection features of RSX-11M were included in the 227X system to provide barriers against accidental interference of one user by another. Multi-user protection also provides a mechanism for prohibiting unauthorized access to your 227X.

The Account File is a system file that is hidden from the user. Each entry contains a UIC (account number), password, user's system device that is assigned the logical name SY:, first name, last name, date and time of the most recent log in and the number of times the user has logged into the system.

The UIC and password or last name and password identify the account. The UIC specifies the log-in UIC (also called protection UIC) that is associated with your terminal. This plays a role in the file protection mechanisms. Although a non-privileged user may change the default UIC with a SET /UIC MCR command, the protection UIC will stay the same. When a privileged user changes default UICs, the protection UIC also changes.

The UIC is a number pair where the first number is a group number and the second an owner or programmer number. The first number should be assigned to a group function. Normally, there would be many users with the same group. The second number, however, should be unique to a person. This serves to identify a user. If a user is working on several projects, then one account may be assigned for each project. The group number for each project would differ. However, the programmer number would be the same.

Group numbers from 1 through 10 have special meaning. If a user logs in with one of these group numbers, this terminal is made privileged. No installation needs more than one privileged account for use by the operator. Use the UIC [5,10]. Avoid [1,*], as accidents with these UICs can lead to a loss of critical data. Do not assign user accounts with group numbers less than 11, because privileged terminals bypass many of the protection mechanisms.

User tasks, system executives, macros, indirect command files, etc that govern and control overall operation of your 227X are files that are in UFDs on the system (LB:) and applications volumes (LB1:). Other volumes (SC0:, SC1:, AL0:, etc) may also have UFDs that are assigned to specific tasks. These special UFD assignments are listed in Table 4-1.

Table 4-1
SPECIAL USER FILE DIRECTORY ASSIGNMENTS

UFD	Function
[0,0]	Master File Directory, RSX-11M User File Directories (UFDs), Account file, bitmap, checkpoint files
[1,1]	RSX-11M System Libraries
[1,2]	System Common Files (LOGIN and HELP Text, etc)
[1,3]	Reserved for RSX-11M VFY Task (lost files)
[1,6]	Error-logging
[1,7]	UFD for queue manager (line printers)
[1,54]	RSX-11M System Tasks (EDT, TECO, PIP, etc)
[2,1]	Help files
[2,1X]	227X Reserved
[2,2X]	ATLAS Software
[2,3X]	GRnet networking system software
[2,40]	GenRad SCAN software
[2,50]	CAPS Scheduler software
[2,60]	TRACS System software
[2,7X]	GenRad Utilites
[2,10X]	High-level languages
[2,11X]	Reserved for GenRad STI
[2,12X]	Reserved for GenRad STI
[2,13X]	Reserved for future use
[2,14X]	CADMATE software
[2,15X]	DECNET software
[5,XXX]	System Manager
[5,10]	System Indirect Command Files
[6,XX]	CAPS Scheduler ([6,1] through [6,77]
[200,200]	Default UFD for 227X Applications Files
[377,377]	Recommended guest UFD

A side effect of the Account File you should be aware of occurs when a person who has two or more accounts uses the same last names and password for each account. If the person specifies UIC and password, there is no problem because the UIC uniquely specifies the account. If the person uses a last name and password, HEL will select the first account it finds that matches the name and password specified, which might not be the desired account. To avoid this problem, encourage users to specify a UIC instead of their last name or encourage users to select unique passwords for their accounts.

The ability to specify a system or default device for a user in the Account File provides a mechanism to distribute the load on your disk resources. The device specified in the Account File is assigned a log-in logical name SY: that cannot be changed by the user. The user can, however, supersede that assignment with a local logical device assignment (MCR ASN command). When all local assignments are cleared, the default system device becomes that assigned at log-in time.

The first and last names identify the user. The first name is an optional argument for the HEL command. The date and time of last log in and the count provide some valuable system access information.

The Account System provides the basis for protection mechanisms in two dimensions. First, it assigns a log-in UIC which establishes a user's rights for file access. Second, by virtue of the group number it establishes whether or not a terminal is privileged.

4.2.4 Creating a New Account File

All operations on the Login Account File are done via the account file maintenance program ACNT, which is documented in Chapter 2 of the DEC MCR Operations Manual. ACNT allows privileged users (with group numbers less than 11) to create a new account file, add new accounts to the file, examine individual account entries, modify individual account entries, list all the accounts, delete an account and sort the account file. ACNT allows non-privileged users to change their password, first name and/or last name.

To create an account file for your system, if one doesn't already exist, simply follow the instructions described in the DEC MCR Operations Manual. To determine whether or not your system has an account file, type the following command from the console terminal after system "boot:"

```
>PIP LB:[0,0]RSX11.SYS/FU
```

If a file exists, the /FU directory listing should be successful. If the file does not exist, privileged users can copy the account file from the Master Distribution pack with PIP. This is useful for backing up the account file or installing the account file on several systems. For example, to copy the account file to a privileged UIC on SR0:

Log in privileged.

```
>PIP SR0:/NV/FO=LB:[0,0]RSX11.SYS
>PIP SR0:RSX11.SYS/PR/SY:RWED/OW:RWED/GR:/WO:
>BYE
```

The first PIP command copies the file to SR0:. The second PIP command sets the file protection so that only a privileged user (SY) or the file owner (OW) can read, write, extend or delete the file. Group (GR) and World (WO) cannot access the file.

If you run out of room in your account file you can make the file longer by using the /BL switch. The following example copies an account file and allocates 50 blocks to the file:

Log in privileged

```
>PIP LB:[0,0]RSX11.SYS/NV/CO/BL:50.=LB:[0,0]RSX11.SYS
```

If the copy was successful, purge the older copy and reset the file protections with the commands:

```
>PIP LB:[0,0]RSX11.SYS/PU
>PIP LB:[0,0]RSX11.SYS/PR/SY:RWED/OW:RWED/GR:/WO:
```

4.2.5 Adding, Changing, and Deleting User Accounts

Adding, changing, and deleting user accounts are easy operations when ACNT is used. Just be careful not to use option C (Create file) when you really meant A, D, E, or one of the other options.

To add an account, choose option A. The ability to specify a default system device provides an opportunity to balance your disk usage. For example, if you are using DM2: and DM3: as user scratch devices, you might want to specify one of them as a default system device. If you are unsure, you can respond SY0: (note, however, that SY0: is the system disk, LB0:)and then change it later. The only restriction is that you must use one of the physical device or pseudo device names such as DM0: or SY0:, not a logical name like SC1:.

ACNT will attempt to put a UFD on whichever device you specify as the default. If the user is to have UFDs on other disks as well, you will need to install the UFDs manually on those disks with the MCR UFD command. If a UFD gets installed on a disk on which you don't want that UIC, such as on the system disk, you can remove the directory by deleting the UFD file from the [0,0] directory. The following example removes UFD [100,73] from DM3:.

Log in privileged and type

```
>PIP DM3:[100,73]*.*;*/DE
>PIP DM3:[0,0]100073.DIR;1/DE
```

The example below enters a new UIC [100,73] into the system, specifies DM2:(SC0:) as the system device and puts UFDs on SC1: and SR0:.

Log in privileged, and type:

```
>ACNT                        (assumes ACNT is installed,
                              2271/2272/2275 only)
or, for 2270 systems, type:

>RUN DKn:[1,54]ACNT          (DKn: must be loaded with master
                              distribution disk)
```

```
>ACNT                                          (assumes ACNT is installed)
  * ACCOUNT FILE MAINTENANCE PROGRAM *
Options are: A - ADD, C - CREATE FILE, D - DELETE, E - EXAMINE:
L - LIST, M - MODIFY, S - SORT, CTRL/Z - EXIT
Enter option: A                                (ACNT prompts for inform-
                                               ation, add entry selected)
Enter account or <ESC> for options (N,N): 100,73 (account)
Password (<=6 CHARS.): X                       (password)
Default system device (DDU ): DM2              (default device)
First name ( <=12 CHARS. ): John               (first name)
Last name ( <=14 CHARS.): Smith                (last name)
Enter user CLI (default=MCR): MCR              (CLI default)
Slave terminal? [Y/N]: N                       (terminal is not
                                               "slaved" at log-on)
Enter account or <ESC> for options (N,N): <ESC> (get back to options)
Enter option: ^Z                               (CTRL Z to return to MCR)
>UFD SC1: [100,73]                             (add UFD on SC:)
>UFD SR0: [100,73]                             (add UFD on SR:)
```

Changing and deleting accounts follow a similar pattern. Log in privileged, run ACNT and choose the proper options.

4.3 SYSTEM ACCESS CONTROL

4.3.1 General

System managers can limit user access to the monitor and the system software. This may be necessary to protect the system against accidental loss of data (perhaps caused by an uninitiated, "curious," or even "hostile" user), to prevent operators from doing operations other than board testing, or to prevent accidental re-booting of the system, etc. Two mechanisms, used together, provide this protection; they are the LIMIT/UNLIMIT monitor commands, and the MONITOR ENABLE keyswitch (switch is not available on a 2275 Board Test Workstation).

NOTE

The Limit/Unlimit mode for a 2275 system is different from that used on the other 227X systems. Only the software "switch" is available on the 2275 system.

The LIMIT command prevents the operator from performing any monitor operation other than RUNning Diagnose mode in the Test sub-mode or running any previously prepared Batch job. The UNLIMIT command must then be used to provide full access to the monitor and system software. Operation of the LIMIT and UNLIMIT commands are described later.

The MONITOR ENABLE keyswitch is used to enable and disable the INITIALIZE button on the tester. When the keyswitch is set to OFF, the system cannot be re-booted, thus preventing unauthorized access to the system.

4.3.2 Operation of the LIMIT and UNLIMIT Commands

The LIMIT and UNLIMIT commands are issued from command mode (UNLIMIT only from the Diagnose page) and initiate a dialog with the user to set or request a password. This password is set by the LIMIT dialog. Use of the LIMIT command is as follows:

a. From command mode (any page), issue the command:

```
#LIMIT
```

b. The monitor will ask:

```
Password:
```

Enter the current password (up to 32 ASCII characters). If this is the first time you are using LIMIT, the password is "GENRAD." Notice that the password is not echoed (displayed) at the video display. This is true for all password entries using the LIMIT and UNLIMIT commands.

c. The monitor will next ask:

```
New Password (<RETURN> to keep the same):
```

Enter a new password, if desired. Press the RETURN key if the current password is to be kept. If a new password is entered, the monitor will ask:

```
Retype new password for verification:
```

Verify the new password by retyping it.

After the new password is verified, or the RETURN key pressed, the monitor will immediately display the Diagnose page with the Mode option set to [Test]; the Mode option line will not, however, actually be displayed. Users are now limited to testing boards with the system, running any existing batch jobs, or executing an UNLIMIT command.

To use the UNLIMIT command:

a. Enter the command:

```
#UNLIMIT
```

b. The system will ask:

```
Password:
```

Enter the current password (not echoed to the video display). If the password that was entered is correct, then full access to the monitor will be available. If the password is not the correct password, the system remains LIMITed. No error message is displayed for an incorrect entry.

If the current password is forgotten and the system remains in LIMIT mode:

a. Set the MONITOR ENABLE key to ON and re-boot the system. Prior to the display of the system initialization message, issue a CTRL C to obtain an MCR prompt.

b. From the MCR prompt, issue the command:

```
MCR>ABO AT.
```

The system will respond with the message:

```
TASK ...AT. TERMINATED
ABORTED VIA DIRECTIVE OR MCR
AND WITH PENDING I/O REQUESTS
```

c. Create a password file with the command:

```
>PIP PASSWORD.TXT=TI:
ABC
^Z
```

The system can be re-booted and the UNLIMIT password will be changed to ABC. The file PASSWORD.TXT will be automatically deleted by the system upon bootup.

NOTE

The UNLIMIT password is not stored in the file PASSWORD.TXT, but the existence of this file will cause the password to be changed when the system is booted.

4.3.3 Suggested Guidelines

There are a few considerations that should be noted when LIMIT and UNLIMIT are used. First, you may not want to prevent system programmers from having access to the system after board testing is completed. Secondly, LIMIT must be used with the MONITOR ENABLE key set to OFF to be effective. Lastly, make certain that batch jobs allow only those operations that relate to board testing or other system manager approved functions.

4.4 ADDING FILE DIRECTORIES VIA THE UFD DIRECTIVE

It may be desirable to add additional file directories to a disk device in order to segregate different types of files. For example, if several programmers use the background terminal, they may each want to store their programs in separate directories. In this case, the system manager can create additional User File Directories (UFDs) from the foreground terminal by responding to the MCR prompt as shown in the following examples:

```
>UFD SR1:[200,201]
>UFD SR1:[200,202]
```

This creates a separate directory for each user. The system manager can assign one of these directories to each programmer. In some installations the system manager may want each programmer to have a separate scratch file directory as well, e.g.,

```
>UFD SC1:[200,201]
>UFD SC1:[200,202]
```

Users can specify their own directories for accessing a file by including their own UIC in the file specification. For example,

```
SR0:[200,201]ZONK.TPG
```

rather than simply

```
SR0:ZONK.TPG
```

NOTE

User UFDs should be discouraged on SCn: because the scratch area will become fragmented unless cleared by each user.

Partitions and Installed Tasks – Section 5

5.1 INTRODUCTION

The 227X executive is delivered with a configuration optimized for your needs. The intent of this section is to provide some information about how and why your executive is structured as it is. It will not be a tutorial on configuring RSX-11M systems. Background information on partitions and installed tasks can be found in the Introduction in the DEC RSX-11M MCR Operations Manual.

5.2 RECOMMENDED MEMORY PARTITION STRATEGY

The basic strategy is to install key system tasks in dedicated partitions to prevent system deadlock and to put the rest of the tasks in a large, system-controlled partition.

A large, system-controlled partition for the applications tasks is the most efficient way to utilize main memory because it allows the system to make memory allocations dynamically at run time. If the system-controlled partition is the highest partition in the system, then it expands dynamically to take advantage of all the main memory. When a task needs memory, the system will allocate memory to it and, if necessary, shuffle running tasks to create a segment of memory that is large enough for the task.

Some tasks must be assured of access to main memory for the system to function properly. Most important are MCR and F11ACP. Other tasks, if in memory all the time, can improve throughput. Examples are the shuffler task and the task termination. The loadable drivers, however, are modules that must be in main memory at all times to provide timely response to device interrupts.

MCR and F11ACP have been installed in separate dedicated partitions. MCR must be present to respond to MCR commands. F11ACP is involved in every disk access. The loadable drivers are installed in a separate, dedicated system-controlled partition. SHF..., the shuffler task, is installed in the dedicated partition with MCR so that it can be guaranteed memory when it needs to run to compact the system-controlled partition.

5.3 INSTALLING AND REMOVING TASKS

Tasks can be installed and removed with VMR or MCR through the INS and REM commands. Also, tasks are implicitly installed and removed with the install, run, and remove options in the RUN command.

If you plan to install new tasks, specify the GEN partition, which is the large, system-controlled partition. Do not install anything in the dedicated partitions because you will risk a system malfunction.

You may decide to remove some rarely used tasks from the system disk, however, you must not remove the following tasks as they are required for minimal operation of your system:

LP:, DK:, DM:, FW:, CO:, TT:	Device drivers
...MCR	MCR
MCR...	Executes many MCR commands
...MOU	Mounts disks
...INS	Installs tasks
F11ACP	Files-11 ancillary control process
...SAV	Saves and restores the system
...AT.	Indirect command file processor
TKTN	Task termination notification routine

Tasks that are frequently used and should be installed:

SHF...	Compacts system-controlled partitions
PRT...	Print spooler
...ED2 (TEC)	Editors
...ACS	Allocate checkpoint space
...PIP	Peripheral interchange program
...HEL	Multi-user log in
...BYE	Multi-user log out
...DMO	Dismount disks

5.4 TASK PRIORITY AND CHECKPOINTING STRATEGIES

When you look at a busy RSX-11M system, it appears to be running a number of programs at the same time. This is in contrast to simple batch systems which run only one program at a time. The illusion of two or more programs running at the same time results from sharing the central processor for very short time intervals. Closer examination reveals that only those programs in main memory are running. This illustrates the fundamental rule that a program must be in main memory before it can run.

The question of which program runs is determined by the priority of the task and whether or not it is in main memory. Processor scheduling for RSX-11M is based on a priority-ordered, event-driven algorithm, that is, the highest priority task in main memory that is ready to run is allocated to the processor until the task is finished or blocked. A task is blocked when it waits for something like an I/O request to finish. Within tasks running at the same priority, the scheduler tends to "round robin." For example, the running task at the priority of, say, 50 runs until it is finished or blocked, or its time quantum is exhausted. At that time, the next task in the queue at 50 runs unless a higher priority task is ready to run.

This consideration of processor scheduling leads to a few useful rules:

1. A task should have a high priority only if it must preempt other tasks and it will complete its task very quickly. Examples are MCR, SYS, F11ACP and some of the MCR tasks.
2. The corollary to (1) is that long-running, processor-bound tasks should have a low priority. Otherwise, the processor-bound job could lock up the entire system.

The best recommendation is to follow the default priorities. Applications tasks should default to 50. If you want a processor-bound task to run in "background," you might want to install it at priority 40. Editors should run at priority 55 to provide respectable keyboard response.

Checkpointing is the mechanism for sharing main memory when there are more tasks requiring memory than there is main memory to hold them. Checkpointing occurs only when there is a high priority task out of memory that needs to run and all the main memory is occupied by lower priority tasks that are checkpointable. The executive will choose one of those tasks and move it to disk and then copy the higher priority task into main memory and allow it to run. It is important to note that the task must be checkpointable, no matter what its priority, before it can be moved out of main memory to make room for a higher priority task. This is why it is important that, whenever possible, you install tasks that are checkpointable.

5.5 CHANGING PRIORITIES OF SYSTEM TASKS

Para 6.5 of this manual describes the effects of relative task priorities on the performance of a multi-user system.

NOTE

Never alter the priority of a user task to a value below system tasks or above 60, as it may cause severe problems when an important system task must run.

The system software is shipped with the editor priorities at 55 and the run-time system priority at 61. These priority assignments can be changed to maximize board throughput or to improve response time during edit sessions, but not both. When the response of one is improved, the other one always suffers to some degree. Note that, if only one user is on the system at a time, changing the priority of either task will have no effect on the system response time. A single user always runs as if at maximum priority, but may not be making maximum use of system resources.

To alter the relative performance of, say, the ED2 editor versus the run-time system, proceed as follows:

1. Altering the priority temporarily: If you wish to alter the priority of a task temporarily (e.g., if you want to lower the priority of the background editor so that it will have minimum impact on board throughput), proceed from the foreground terminal as follows:

```
>ALT ...ED2/PRI=59.
```

This raises the ED2 editor priority. If much background editing is being performed, this should improve slightly editor response time, while at the same time causing some degradation in board througput.

2. Altering the priority permanently: To change ED2 priority in the operating system to 51, for example, edit file LB0:[1,2]STARTUP.CMD to add:

```
>ALT ...ED2/PRI=51.
```

Note that, if desired, the system can be restored to its initial state (prior to the change). To do so, either re-edit the STARTUP.CMD file or copy an unedited version from backup to LB0:[1,2], then re-boot the system.

6.3.2 Cleaning-up Disk Surfaces

Any of the devices used for file storage may become clogged with versions of files that are no longer needed, thus cutting down on the space available for storage of needed files. The scratch devices (SCn:) in particular tend to become overloaded with unwanted files. An indirect command file is available to assist users in cleaning-up these devices. This file may be invoked with the command:

```
>@LB0:[5,10]DEVCLEAN
```

When the RETURN key is pressed, the user will be asked:

```
>* Enter Device to be "Cleaned Up" [S]:
```

Enter the device name (i.e., SC0:, SC1:, AL0:, etc). DEVCLEAN will next ask:

```
>* Enter date of newest file to delete (i.e., 27-AUG-79) [S]:
```

Enter a date in the format dd-mmm-yy (dd is the day, mmm is the month, yy is the year) as shown. All files created before the specified date will automatically be deleted as the indirect command file is run if the user answers Yes to the next question:

```
>* Are You Sure? [Y/N]:
```

If the user answers No to the question, the date prompt will be repeated. If you answer with a CTRL Z (^Z), the command file will be terminated. After answering Yes to the last question, the user will see a number of MCR commands being issued from the DEVCLEAN file. If an error occurs during the procedure, you might be able to abort the command file. At the end of the procedure, a message that the files were cleaned up will be displayed.

Set procedures will probably be established by the system manager to clean the SCn: devices at periodic intervals (once or twice a week, for example) so that room will be available on these surfaces for all users.

6.3.3 Backing Up On-Line Disk Data

If you choose to provide long-term storage using SR: devices, as was suggested in the discussion of disk management policies, you should consider some method of reducing the risk of accidental loss of data. Many people complicate backup by trying to combine archival storage with protection against catastrophic loss of data.

One very effective procedure for protecting against catastrophic loss of data is to make a copy of the data on a daily basis. Then, encourage users to archive their critical files off line on private disk cartridges. This puts the responsibility for catastrophic losses on the system and the responsibility for archival storage on the users.

6.4 RE-ENTERING THE BACKGROUND MONITOR

To re-enter the background monitor from MCR, log in as a background user:

```
>HEL GR2270/BACK
```

The LOGIN.CMD command file on the login SY: will invoke the file MD:[2,10]227DPTCH.CMD. This will bring up the background monitor as if the system had been booted, without affecting the foreground task.

6.5 EFFECTIVE FOREGROUND/BACKGROUND OPERATION

6.5.1 Introduction

This paragraph describes how the foreground task interacts with the background task within the DEC RSX-11M system and suggests ways to tailor the system to suit the needs of a particular installation.

A typical scenario for the most effective use of the multi-user system would be as follows:

1. The foreground user is testing boards, and
2. The background user is creating source files using the TEX text entry program, correcting those files from the ED2 editor, creating a batch file, and then running the Batch process to develop the test program via ATG.

In effect, the foreground user is primarily expected to test boards, while the background user is expected to be either editing source files or running ATG, Translate or some Batch type activity. The system has been tuned to optimize both throughput and user editing response. The ED2 editor has been provided because it makes very efficient use of the central processing unit and thus causes very little degradation on board test time. All other system tasks have been tuned to run at a lower priority than either the editors or the run-time system (Test or Debug submodes in the foreground monitor). The background monitor, for example, will run somewhat slower than the foreground monitor during board testing.

6.5.2 Effect of Background on Board Test Times

A multi-user system is shipped with several installed system tasks including the run-time system, the background editor (ED2), and the text entry program (TEX). These 3 tasks perform the following important functions:

1. The RTS (run-time system) task is run from the foreground monitor and is used to test boards. In a production line environment, where a large number of boards must be tested each day, high board throughput is very important.
2. An editor is used by programmers to create or repair the source code that is used to develop test programs for testing boards.

The software for the multi-user option has been set so that the foreground run-time system usually has higher priority than the background task. The exception to this is when the background task is the ED2 editor (or the TECO editor if invoked by MCR command outside the background monitor). If the editor is invoked from the background terminal, it runs at the same priority as the foreground run-time system or higher than other development tasks such as ATG, the Digital or the Analog Librarian, or the Translator.

The TEX text entry program runs at a lower priority than the run-time system task yet provides excellent response. It is highly recommended that TEX be used for the initial entry of any source data from the background terminal.

6.5.3 Effect of Background on Board Test Accuracy

The system software has been designed to minimize the effect of the background task on the accuracy and repeatability of a board test. However, if components appear to fail intermittently while background is active but do not fail when foreground is operating alone, there may be a marginal time delay for that component. If there are any questions, please contact GenRad.

6.5.4 Relative Priority Considerations

The system manager may need to make adjustments to obtain optimum system performance based upon experience gained at his facility. In this regard, the most significant decision that must usually be made is in establishing the relative priorities of the foreground run-time system and the background editor. There are two points to consider in changing relative priorities:

1. If maximum board throughput must be achieved, the editor in background can be lowered in priority and still used at the expense of lower user response time.
2. If editing speed is important, the editor response can be improved slightly by increasing its priority to 60. This is not recommended for most installations, as it may cause unneccessary degradation in board throughput times.

Table 6-1 illustrates the effects on both the foreground run-time system and the background editor, based upon a system manager's decisions.

Table 6-1
PERFORMANCE LEVELS IN A TWO-TASK ENVIRONMENT

LEVEL	FOREGROUND RUN-TIME SYSTEM	BACKGROUND EDITOR
VERY GOOD	WHENEVER BACKGROUND IS NOT RUNNING THE EDITOR, OR IF THE BACKGROUND EDITOR IS SET TO A LOWER PRIORITY. WHEN BACKGROUND USER USES THE TEX PROGRAM.	WHENEVER BACKGROUND EDITOR IS SET TO A HIGHER PRIORITY THAN THE RUN-TIME, OR WHEN BACKGROUND RUNS THE EDITOR AND FOREGROUND IS NOT RUNNING THE RUN-TIME SYSTEM. WHEN THE TEX PROGRAM IS USED.
GOOD	WHEN BACKGROUND RUNS THE EDITOR AND FOREGROUND RUNS THE RUN-TIME SYSTEM, EACH AT THE SAME PRIORITY.	
SOME DEGRADATION	IF BACKGROUND EDITOR IS TECO, AND IS SET TO A HIGHER PRIORITY. ED2 AT A HIGHER PRIORITY STILL PROVIDES "GOOD" BOARD THROUGHPUT.	IF BACKGROUND EDITOR IS SET TO A LOWER PRIORITY.

The relative performance (in terms of execution time) was obtained under worst case where there was NO time allowed for loading and unloading boards. The editor performance always improves while the board is taken off the fixture and a new one put on.

6.5.5 Aborting Foreground Tasks

Under normal operating conditions, no monitor task should be aborted. If, however, the foreground user causes foreground to loop, the system manager can end this condition by aborting the indirect-command processor task that is running the foreground monitor by issuing commands from the background without re-booting the system. To abort a monitor:

a. Issue ABO to shut down the background monitor.

b. Issue a ^C to obtain an MCR prompt (MCR>).

c. From MCR, issue the command:

```
MCR>ABO MON000
```

to shut down the indirect-command file processor and to return to MCR (>). This must be done from a privileged terminal, logged on to a privileged account, if the monitor to be shut down is not the monitor you are using (as in the case of the system manager shutting-down the foreground monitor from the background terminal).

d. Resume operation by issuing the command:

```
>@SY:2270
```

6.6 SETTING TIME AND DATE (2270, 2271, and 2272)

The system monitor time and date are automatically updated with input from the clock board (via RSX-11M) whenever the system is initialized. To update these clock board values the user must perform the following:

NOTE

This procedure is used to set the time and date for 2270, 2271, 2272 systems only. For 2275 systems use the TCU utility that is described in Section 3.

a. Log on as a privileged user.

b. Manually set the Clock Board WRITE/PROT switch (S1) from the PROT (down) to the WRITE (up) position (see Figures 6-1 and 6-2).

c. Enter the new time and date by typing:

```
>TIME hh:mm:ss  dd-mmm-yy (for example, 23:59:59 21-MAY-83)
```

d. Type the command:

```
>RUN LB0:[2,70]TIMCAL
```

The TIMCAL program reads the software system time into the Clock Board. When TIMCAL has finished running, the display will list the two sets of octal words that comprise the values for the time and date which are read between the Clock Board and RSX-11M software. These values (SET and READ BACK) should be equal, and the second line displayed (HARDWARE TIME) should be close to the value entered. The display would look like this for a 21-MAY-83 23:59:59 entry:

```
SET=011507,170020    READ BACK=011507,170020
HARDWARE TIME= 5/21/83  23:59:59
```

If SET and READ BACK are equal but the HARDWARE TIME is not close to the value entered, then the software system time is wrong. To insure against incorrect entries, repeat the update process listed in steps a through d above.

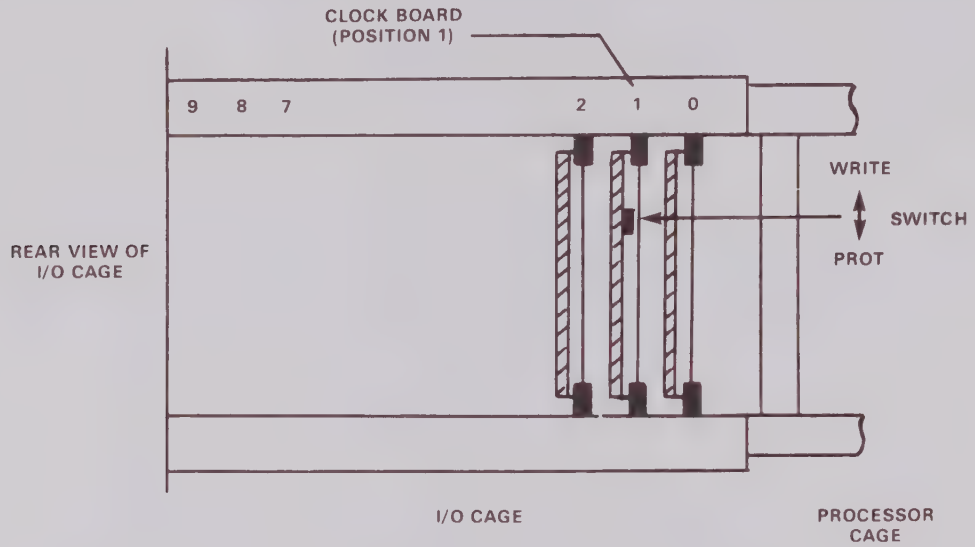

Figure 6-1. Clock Board Location in 2270 and 2271 Systems.

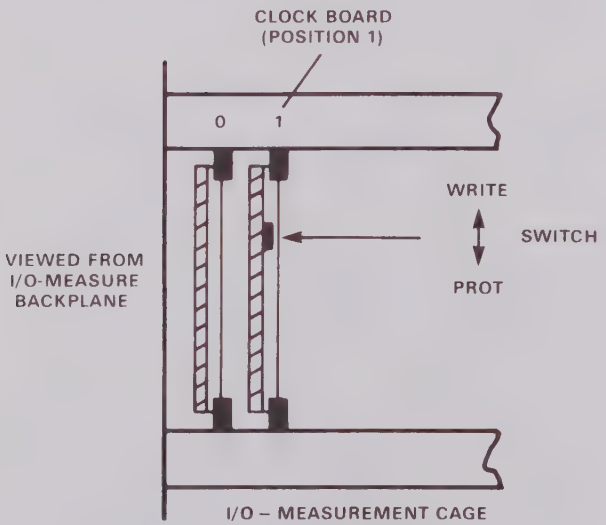

Figure 6-2. Clock Board Location in 2272 Systems.

6.7 TEST FIXTURE CONTROL

The system Parallel I/O unit (0) should not be used during normal UUT testing and should not be indiscriminately accessed by the user. It is usually reserved for system use only. Optional Parallel I/O units (Relay Driver boards) are available for user functions. It is possible, however, for the user to control the vacuum to the test fixture and sense its status via Parallel I/O

unit (0). The Test Programming manual describes the test language statements dealing with Parallel I/O (PIO).

The following are specific applications of those statements for controlling and monitoring either single or dual test fixtures. Note that the keyword CLOSE activates the vacuum and OPEN deactivates it.

1. SET PIO(0) HRLY(CLOSE 1);

   Activates the vacuum to the right (or single) test fixture. Leave all other relays on the system Parallel I/O unit unchanged.

2. SET PIO(0) HRLY(CLOSE 2);

   Activates the vacuum to the left test fixture, in a dual fixture application.

3. DECLARE BSTRING FIXT(16);
   ¦
   ¦
   MEAS PIO(0) SWITCH INTO FIXT;

   Read back the state of the latches on the system Parallel I/O unit into bit string variable FIXT. A 1 in bit 1 indicates that the right (or single) fixture contains a UUT; a 1 in bit 2 indicates that the left fixture contains a UUT. A 0 in either bit indicates that the fixture contains no UUT.

4. SET PIO(0) HRLY(OPEN 1,2);

   Deactivates the vacuum to both the right (1) and left (2) fixtures.

Trouble Analysis - Section 7

7.1 INTRODUCTION

This section describes some procedures you can use to improve system operation, or to try when malfunctions occur. Many times what appears to be a catastrophic failure may simply be the result of a switch set wrong, or a device not turned on, etc. Do not try to perform any other type of servicing unless you are a qualified service person.

7.2 THE SYSTEM WON'T BOOT

The most common causes of a system failing to boot are:

1. System disk is not ready.
2. System disk is write protected.
3. Hardware malfunction.
4. System disk has been corrupted.

Be sure the system is powered up, the system disk is spun up, ready, and write enabled. Try the boot again.

If that fails, try to boot a known good system such as your back-up disk. Check your system and try the boot. If it fails, odds are you have hardware problems. If the boot succeeds, you probably have a bad or corrupted system disk.

If it looks as though your system disk has been corrupted, you should stop and run the system OVP. System disks, especially those in sealed drives, just don't get corrupted! Corruption is usually caused by hardware malfunction or human error. Reformat the disk and check the disk for bad blocks with the BAD utility, prior to restoring your system. If your bad system is on a removable cartridge, it is possible that the corruption resulted from accumulated dirt. If so, you should use a new cartridge. Regular preventive maintenance, including air filter replacement, will help to prevent these problems.

7.3 BACKGROUND TERMINAL WON'T WORK

When a terminal refuses to work, there are a few things you can check to get it back on line. Some common causes of terminal problems are:

1. Terminal is not plugged in and turned on.
2. Terminal is not connected to the computer or the cable is broken.
3. Someone has typed a CTRL S or used the NO SCROLL key.
4. Terminal is in HOLD mode.
5. Terminal is set to SLAVE.
6. A task has attached the terminal.
7. Terminal keyboard has been locked because binary file has been listed on a VT10X (KEYBOARD LOCKED indicator lit).
8. VT52/ANSI SET-UP bit (second word, third bit) set to VT52 (set to 1).
9. Terminal is set to incorrect transmit and receive speeds.

Insure that the terminal is plugged in, turned on and, if applicable, has paper. Put the terminal in local mode with SETUP to see if it will function. If it does, put it ON LINE and type CTRL Q (the CRTL Q clears an outstanding CTRL S or NO SCROLL). Try to raise the MCR prompt by typing CTRL C. Typing SETUP and the 0 key (SETUP/RESET) unlocks a VT10X keyboard.

If the terminal still refuses to work, check to determine whether or not there are any active tasks running from the terminal. If there are, one of the tasks may have the terminal attached for I/O. You may abort the tasks (ABO) from the privileged terminal, if you wish.

If the problem has still not cleared up, use a privileged terminal to set the malfunctioning terminal to NOSLAVE and NOHOLD with the MCR SET command. Next, use the SET /SPEED command to determine the receive/transmit speeds at the interface. If the speeds at the interface differ from the speeds at the terminal, adjust either the interface or the terminal until their speeds match.

If the above fails, odds are the problem is hardware. Turn the VT10X power off and on to clear the terminal. Swap the terminal with a known good terminal if one is available. If the good terminal fails, the problem probably is in the connector. Plug the terminal into a known good line, adjust the speeds if necessary, and try it. If the terminal fails, the problem is probably with the terminal.

7.4 A DISK PLATTER STARTS GIVING RANDOM ERRORS

Rarely, a good disk cartridge will start yielding random errors. Most often the errors are induced by environmental factors, not software problems. Common causes of failure are:

1. Dirt on the surface.
2. Cartridge is at a different temperature than the drive.
3. Humidity.
4. Head alignment.
5. Corruption after system or program failure.
6. Corruption resulting from human error.
7. Hardware failure.

The problem is how to retrieve the good data from the disk before any more errors occur. The fundamental rule is not to write any new data on the drive until you have recovered the existing data and determined what caused the problem.

If other cartridges give I/O errors when in the drive, you may have hardware malfunctions or a head alignment problem. If a disk gives no errors in one drive but gives read errors in another drive and both drives pass diagnostics, suspect head alignment or a drive hardware failure.

If you are confident the problem is with the cartridge and not the drive, put the cartridge in the drive, spin up the drive and wait 10 to 15 minutes to allow the cartridge and drive to reach the same temperature. Use VFY to reconstruct as much of the volume as possible. Next, use PIP to copy all the files to another disk. Then, reformat the disk with the FMT utility and check for bad blocks with BAD.

If BAD shows bad blocks and the disk is in a dirty, humid environment, you should probably get the cartridge cleaned before you put it back into

service. Dirty cartridges can also cause catastrophic head crashes. If a cartridge is dropped, you should have it checked for damage.

Humidity can also cause a problem on an otherwise good cartridge if the cartridge is stored in a warm, humid area and then brought into an air-conditioned area prior to use. To avoid this problem, store the cartridge in the same environment in which it will be used.

7.5 A DISK DRIVE FAILS

When a disk drive fails, the drive itself has failed or you have a cabling problem. If the drive does not have power, check and reset the power breakers at the back of the drive. If the drive has power but doesn't spin up, make sure you have a cartridge in the drive, it is properly seated, and the door is latched. If the drive is spun up but will not respond, have a service person check the drive.

7.6 A PROGRAM MYSTERIOUSLY STOPS WORKING

Except in rigorously verified programs, it is possible to uncover a software malfunction (bug) during use. However, if a heavily used program suddenly fails to execute functions that it has successfully executed in the past, it probably is not a bug but something else. Causes of this type of failure are:

1. Image of the program was corrupted on disk.
2. Task control information in the executive in main memory was corrupted.
3. Task checkpoint information was corrupted during a checkpoint operation.
4. Failure in main memory.
5. Hardware malfunction.

If the program fails and remains fixed in main memory, you should suspect memory failure. The program fixed in memory prevents another program from using the memory. (The system will sometimes print, at the CO: device, a message indicating a memory parity error.)

Try running the program again. If it works, the problem may have been a checkpoint problem or random hardware error. If the program fails, remove the program (also called a task) with the REM command and re-install it with the INS command. Try running the program again. If it runs, the program probably has corrupted task control information. If it fails, remove it with the REM command and use PIP to copy a new version of the offending task to the system disk. Install it and try again. If this doesn't work, put a known good copy on another disk, install it, and try it. If it still doesn't work, call GenRad Applications Engineering for help.

7.7 THE PRINTER JAMS WHILE SPOOLING FILES

If the printer jams while spooling files, there is nothing you can do to recover the listing that jammed. Set the printer off line, correct the paper jam, and put the printer back on line.

If you want to stop the spooler, type ABO PRT... from a privileged terminal. If you do this, however, you will need to requeue all the files in the spooler queue.

7.8 IN CASE OF POWER FAILURE

If power is lost to the system during operation, the following procedure should be followed.

a. Press the start/stop button so that the disk drive will continue to spin down to a stop.

b. Turn off system power switch so that a return of power will not damage equipment. Do not use emergency switch as power off switch.

c. When power is restored, use normal start-up procedure.

d. Check for locked files. If a file was open for write when power was lost it may be corrupted. Use Unlock utility described in the 227X Test Set Preparation manual to unlock a file and then check the integrity of the file.

Software Updates – Appendix A

A.1 HOW TO USE ZAP

This appendix describes the installation of patches in 227X task files using the DEC ZAP utility. This utility is installed in the 227X Operating System software.

System Utilities such as ZAP are executed from the MCR> level. To get to MCR> level, shutdown the 227X Operating System by typing "SHU". When the Operating System is down, the message "227X HAS BEEN SHUT DOWN" will be displayed on the screen. Press RETURN to display the MCR prompt, ">".

Now, ZAP must be run. The ZAP prompt, "ZAP>", indicates that ZAP is running and will accept commands. An example follows. The comments enclosed in braces are for explanation only. All ZAP commands are executed by pressing the RETURN key.

The general form of the patching procedure using ZAP is outlined here. It is the same for all 227X testers. A more specific example is found at the end of this paragraph.

```
>SET /UIC=[2,10]            {DIRECT THE SYSTEM TO THE 227X OPERATING SYSTEM
                             UIC WHERE THE 227X TASK FILES ARE LOCATED.}
>RUN $ZAP

ZAP>DKN:FILENAME.TSK        {DKN: OR DMN: IS THE DISK WHERE THE FILE CAN BE
                             FOUND; USUALLY LB0: FOR THE SYSTEM DISK, AL0: FOR
                             UPDATING 227X MASTER DISK}

_BLK:ADDRESS;OR             {" " INDICATES ZAP IS READY. "BLK:" IS THE
                             PARTICULAR BLOCK IN THE TASK WHICH CONTAINS THE
                             LOCATION TO BE PATCHED. "ADDRESS" IS THE BASE
                             ADDRESS OF THE PATCH. "OR" IS THE RELOCATION
                             REGISTER 0.}

_0,OFFSET/                  {THE PATCH IS TO BE MADE TO THE CONTENTS IN "BLK"
                             WITH THE EFFECTIVE ADDRESS = OFFSET + BASE ADDRESS
                             STORED IN REG 0. "/" INDICATES THIS LOCATION IS
                             TO BE OPENED.}

_BLOCK:LOCATION/CONTENTS    {ZAP RESPONDS WITH THE BLOCK #, LOCATION
                             REQUESTED, AND THE LOCATION'S CONTENTS.}

_PATCH                      {THE PATCH IS THEN GIVEN.}

_^Z                         {ZAP RESPONDS WITH THE " " TO INDICATE THAT IT IS
                             AGAIN READY. CONTROL Z EXITS ZAP AND RETURNS TO
                             THE MCR> LEVEL.}
```

At this point, the patches are in and the system can be rebooted. We recommend that you check the patch to make sure it is properly installed. Some patches require that previously issued patches be installed correctly. Random patching leads to unpredictable results and cannot be supported.

You should install the patch on a back up working copy of the Operating System Master Disk in case of an error. This provides you with an unaltered Master from GenRad (not to be altered) in case the patch is entered incorrectly and can not be found. If the patch is correct, then all working copies of the Operating System Disk should be recopied from the patched disk.

An example of using ZAP follows. The locations given are for example only; do not patch them.

```
ZAP>LB:REPLVRXX.TSK       {THIS IS THE REPLACE TASK.}

305:156006;OR             {SET THE BLK=305, THE BASE ADDRESS IS 156006.}

_0,162/                   {FIRST LOCATION}
305:000162/ 013703        {THE LOCATION REPORTED IS ONLY THE OFFSET VALUE.
                          THE VALUE 013703 OCTAL IS THE CONTENTS OF
                          THE DESIRED LOCATION WHICH ZAP COMPUTED
                          FROM THE OFFSET+ THE BASE ADDRESS FROM REG 0.}

_063701                   {THE NEW LOCATION CONTENTS}

_0,164/                   {SECOND LOCATION }
305:000164/ 054672
_                         {SINCE THE CONTENTS DO NOT CHANGE FOR
                          THIS LOCATION AND THE NEXT OFFSET IS 166, IT
                          IS POSSIBLE TO OPEN 0,166 BY PRESSING THE
                          RETURN KEY OR YOU MAY TYPE "0,166/".}

_305:000166/ 062701       {THIRD LOCATION}
_062702
_

_305:000170/ 000010       {FOURTH LOCATION}
_

_305:000172/ 060301       {FIFTH LOCATION}
_011110
_

_305:000174/ 011110       {SIXTH LOCATION}
_005011
_

_305:000176/ 005204       {SEVENTH LOCATION}

_305:156006;OR            {RETURN TO THE FIRST LOCATION
_0,162/                    AND VERIFY THAT THE PATCHES
_305:000162/ 063701        WERE ENTERED CORRECTLY.}

_^Z                       {EXIT ZAP AND RETURN TO MCR LEVEL.}
>
```

A.2 HOW TO USE INDIRECT ZAP COMMAND FILES

This paragraph describes an alternative method for doing 227X task image patching. This method minimizes the chances of incorrectly installing the patches in 227X Software Change Notices (SCNs). The method takes advantage of two features of the RSX-11M Operating System: 1) the ability to change information in a file image using the system utility "ZAP" and 2) the ability to run a series of task specific commands contained in a pre-written indirect-command file. Using these two RSX features, we can create a file containing a series of ZAP commands that will install an SCN. Running this Indirect ZAP Command File enables repeated, accurate installations with minimum difficulty.

The Indirect ZAP Command File is created with the 227X Editor. The file should be examined closely for any errors before running it. It is best to verify the old data in each address offset before changing them. This is done in the Indirect ZAP Command File shown as an example. If the old data do not match what is expected, the data are not changed and the SCN patching procedure stops at the point where verification fails. As the old data are verified, each location's content is displayed on the screen. Successful old data verification is followed with the new data installation. A new data verification pass may also be included to ensure that the new data were correctly installed.

An example can best describe Indirect Command Patching. When a 227X UPDATE package containing the Software Change Notice (SCN) package is sent to each 227X customer site, the SCN will document the following information:

1. the 227X RELEASE, VERSION and SCN numbers,
2. the PURPOSE for the patch,
3. name of TASK which is to be patched,
4. BLOCK location for the patch,
5. base ADDRESS,
6. and the PATCH.

```
************************** SCN DOCUMENTATION **************************

                227X Release R Version V SCN NN

     PURPOSE:   To correct a problem of adding an extra carriage
                return to each line of the .INC file by file management.

        TASK:   REPLVXX.TSK
       BLOCK:      177
     ADDRESS:    067624

                offset     old    new
       PATCH:   740  /    5365    240

                742  /  177770    240
***********************************************************************
```

The SCN information is edited into a self-documented file as shown on the next page. For clarity, comments "{....}" have been added which should not be duplicated in the patch. Each line started with a ";" is a comment line. In

the example, the comments document what the file is, when and who wrote it, and what is to be patched. Do not leave blank lines, put comments in between the markers <A> and <B>, or include the markers in the file. Doing so may cause either a ZAP error, misinterpretation as a ZAP command. The slash "/" following the location indicates that a "word" location is to be opened. If the character was a back slash "\" then a "byte" location would have been opened. "V" indicates the data is to be verified. If the "V" character was missing then the location, which was just opened, will be changed instead of being verified. This is dangerous since an error in the location addressing will cause the wrong location to be changed. (If the back slash key is not on the key board then the "\" is generated with the TECO insert command "92I<esc><esc>", issued from the 227X Editor Command Mode.) Here is an example of an Indirect ZAP Command File:

```
;********************** INDIRECT COMMAND PATCH FILE **********************
;227X SOFTWARE CHANGE NOTICE {227LVRVNN.R74}
;WRITTEN FOR THE 227X::MD:[2,10] 01-SEP-83  16:30
;
;       RELEASE:  7
;       VERSION:  4
;           SCN:  XX
;
;          TASK:  REPLVXX.TSK
;         BLOCK:  177
;       ADDRESS:  67624
;
<A>                                     {Do not include marker <A>}
MD:[2,10]REPLVXX.TSK                    {Patch REPLVXX.TSK in MD:[2,10]}
177:67624;0R                            {BLOCK:ADDRESS;use relocation
                                         register 0}
                                        {VERIFY OLD DATA}
0,740 /                                 {examine BLOCK:ADDRESS+OFFSET}
5365V                                   {does verify (V) word location
                                         contain a "5365"}
0,742 /
177770V
                                        {CHANGE TO NEW DATA}
0,740 /
240
0,742 /
240
                                        {OPTIONAL -- VERIFY NEW DATA
                                         CORRECTLY ENTERED}
0,740 /
240V
0,742 /
240V
X                                       {exit ZAP}
<B>                                     {Do not include marker <B>}
;PATCHING WITH 227LVRVNN.R74 FINISHED
;*****************************************************************************
```

To patch the system software, this Indirect ZAP Command File must be executed from the MCR level. To get to MCR level, shut down the 227X Operating System. Once the shut down message has been displayed, type <CTRL>C which will cause an "MCR>" prompt to be displayed, or hit the <RETURN> key which displays

">". Now the file can be run. Make a copy of the 227X Operating System to experiment with until you have concluded that the command file is error free. To run the Indirect ZAP Command File, type these commands:

```
>@LB:[200,200]INDTLK                    {to enable error messages to be
                                         displayed on screen for non-2290
                                         users}
>SET /UIC=[2,10]                        {set to GenRad 227X product UIC}
>ASN =                                  {clear any local assignments}
>ASN LBn:=MD:                           {do a local assignment of LBn:
                                         as the monitor device.
                                         for 229X users LBn: is LB1:
                                         for 227X users LBn: is LB0:}

>ZAP                                    {for all other users}

ZAP>@LB1:[200,200]227LVRVNN.R74         {execute indirect command file
                                         from LB1:[UIC] where the file
                                         resides}
177:0,000740/5365                       {ZAP verification response of
177:0,000742/177770                      old data}
177:0,000740/240                        {verify new data}
177:0,000742/240
>                                       {patch finished, ZAP exited
                                         and system back to MCR>}

>ASN =                                  {clear the local assignment
                                         of LBn: as MD:}
>
```

Two common ZAP error messages may be seen:

ZAP -- ERROR ON COMMAND INPUT {usually indicates file not found}

ZAP -- VERIFY FAILURE {verification data does not match data}.

Having installed the SCN correctly (i.e., no errors), all the working copies of the task must be UPDATED. Depending upon the task affected, the SCN may have to be installed in OVP disks as well as in all copies of the OPSYS disk. Since this information may change from release to release, it will be provided with the UPDATE package and not presented in this manual. We recommend that the archived masters, which the 227X System Manager has set aside, should not be patched. This provides you with unchanged master disks in case a bad Indirect ZAP Command File corrupts the updated masters. Copies of the indirect patch file(s) should be stored on the even surface of the OPSYS Master Disk, in account [2,12] for future reference.

Index

--A--

ACNT, 4-5
ALT, 5-3
Abort, 3-2
Account protection, 4-2
Active, 3-3
Allocate Checkpoint Space, 3-2
Altering priority, 5-3
Assign, 3-4
Assignments, 6-1

--B--

Back, 6-2
Background, 6-3
Backup, 2-4
Bakground, 7-1
Boot, 3-4, 7-1
Bye, 3-4

--C--

Changing accounts, 4-5
Checkpointing, 5-3
Cleaning-up, 6-2
Clock set, 3-12
Command languages, 3-1
Creating Accounts, 4-4

--D--

Deallocate, 3-4
Device management, 6-1
Devices, 3-5
Directories, 4-8
Disk, 7-2
Dmount, 3-5

--F--

File Directories, 4-8
Fixture, 6-6
Floppy formatter, 3-11
Foreground, 6-3
Format, 3-11

--H--

Hello, 3-5

--I--

Indirect command files, 3-14
Initvolume, 3-6
Install, 3-6
Installed tasks, 5-1

--L--

Limit, 4-6
Load procedure (2275), 2-4
Load, 3-7
Loading 229x Phoenix, 2-12
Loading procedure, 2-1
Loading the 2293, 2-14
Logical device, 6-1
Login Accounts, 4-1, 4

--M--

MCR, 3-1
Master disk, 2-1
Monitor Console Routine (MCR), 3-1
Mount, 3-7

--O--

Open register, 3-7

--P--

POOL, 5-4
Partition definitions, 3-8
Partitions, 5-1
Power failure, 7-4
Printer jams, 7-3
Priority, 5-2
Program preparation (229x), 2-11

--R--

Redirect, 3-8
Reloading System Software, 2-1
Remove, 3-8
Run, 3-8

--S--

Save, 3-9
Set, 3-9
Software updates, A-1
System Manager, 1-1
System access, 4-6

--T--

Tasklist, 3-10
Time, 3-10
Trouble, 7-1

--U--

UFD, 3-10
UIC, 4-2
Unlimit, 4-6
Unload, 3-10

--V--

VMR, 3-1, 13
Virtual Monitor Routine (VMR), 3-1

--Z--

ZAP, A-1

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